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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
á	far, calm, father	*fár, kám, fá′ther.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr. stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ö	Goethe (similar to *e* in her)	*gö′tėh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
û	full, push, good	*fûl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hī′dėl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
ṫh	though, breathe	*ṫhō, brēṫh.*
z	zeal, maze, muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

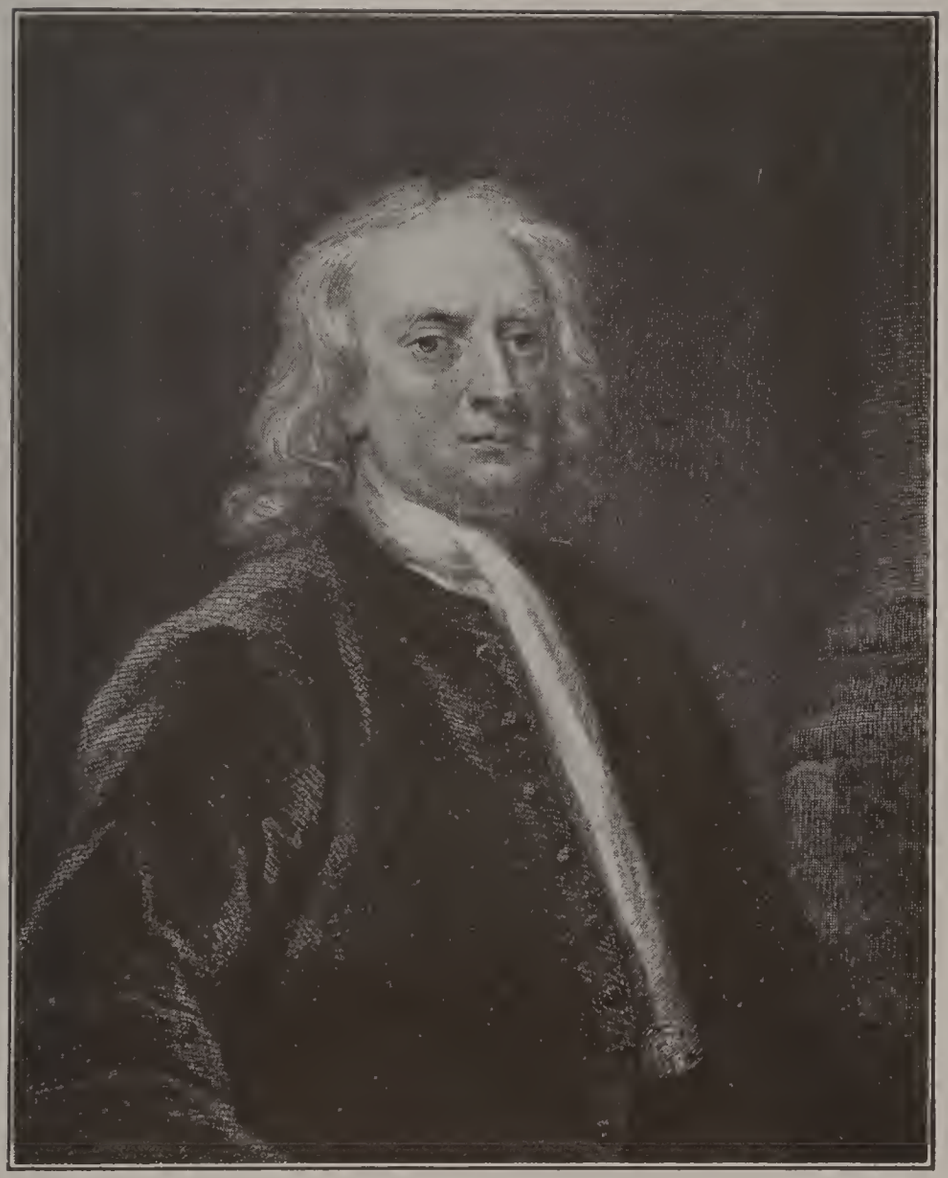
NEWTON, *nū'ton:* city, cap. of Jasper co., Io.; on the Chicago Rock sland and Pacific and the Central Iowa railroads; 35 m. e. of Des Moines. It has an assessed valuation of more than $2,000,000, and does a railroad shipping business of nearly $200,000 annually. It contains co. courthouse (cost $36,000), union public-school building ($45,000), Jasper Co. Normal School, opera house ($30,000), national bank, gas and electric light plants, and weekly newspapers. Pop. 3,876.

NEWTON; city, cap. of Harvey co., Kan.; on the Missouri Pacific and the Atchison Topeka and Santa Fé railroads, at the junction of the Southwestern branch of the latter with the main line; 74 m. w.s.w. of Emporia, 27 m. n. of Wichita. It has planing and flouring mills, carriage and machine factories, railroad repair and construction shops, manufactures of dairy products, etc., schools, library and Bethel (Mennorite) College. Pop. (1910) 7,862.

NEWTON: city, Middlesex co., Mass. It is on the Charles river, which forms its boundary on three sides; and on the Boston and Albany, and the New York and New England railroads, nearly eight m. w. of Boston. It contains 10 villages, connected by a circuit railroad. The city is noted for healthfulness and for the beauty of its surroundings. Many business men of Boston have their homes here. There are water-works, gas-works, an organized fire department, and extensive manufactures for which the Charles river furnishes abundant power. Among the articles produced are carriage, boots and shoes, glue, hosiery, cordage, ink, soap, emery cloth and print cloth, dye stuffs, and various lines of fancy goods. There are also rolling mills and considerable paper is made. In the central portion of the city there is a beautiful cemetery nearly 90 acres in extent. There are numerous churches, academies, good public schools, a lyceum, several libraries, including one free to the public; monthly and weekly papers, and a monthly journal published by scholars of the high school: banks and other financial and commercial establishments. Two asylums are maintained, and there are several noted educational institutions. Among the latter are the N. Theol. Institution (q.v.) at N. Centre; the Lasalle Female Seminary at Auburndale, founded 1851, which gives a classical course of four years, and instruction in English branches; and the English and Classical School, opened 1854, at West N.—The place was settled 1630, was set off from Cambridge and incorporated as a town 1679, and received a city charter 1873. The organization of the first city govt. was effected 1874, Jan. 1. A *History of Newton, Mass.*, by Samuel F. Smith, D.D. was published 1880. Pop. (1910) 39,806.

NEWTON, Sir ISAAC: the most remarkable mathematician and natural philosopher of his own or perhaps of any other age. 1642, Dec. 25—1727, Mar. 20; b. Woolsthorpe, Lincolnshire, England. That year, remarkable in English history for the breaking out of the civil war between Charles I. and the parliament, is doubly remarkable in the history of science by the birth of N. and the death of Galileo. The conditions of science in the respective countries of these great philosophers were not more different than the characters of the philosophers themselves. Galileo died a prisoner, under the surveillance of the Inquisition, 'for thinking, in astronomy,' as Milton says, 'otherwise than the Franciscan and Dominican licensers thought.' In England it had become the practice, and soon became the fashion, through the influence of Bacon and Descartes, to discard altogether the dictates of *authority* in science. The dispositions of the two philosophers were happily suited to the situations in which they thus found themselves. Galileo's was a mind whose strength and determination grew by the opposition that it encountered. The disposition of N., on the other hand, diffident of the value and interest of his own labors, and shrinking from even scientific controversy, might have allowed his most remarkable discoveries to remain in obscurity, had it not been for the constant and urgent solicitation of his friends that they should be published to the world.

N. was the son of a farmer near Grantham, who died before his son's birth. When N. was about two years old, his mother married the Rev. Barnabas Smith, rector of the adjacent parish of North Witham. N. received his early education at the grammar school of Grantham, in the neighborhood of his home. His mother's brother, the Rev. W. Ayscough, rector of a parish near, induced N.'s mother to send her son to Cambridge; and 1661, June 5, he left home for Cambridge, where he was admitted subsizar at Trinity College. On the 8th of July following, he matriculated as sizar of the same college. He immediately applied himself to the mathematical studies of the place, mastering most of the works of any value on such subjects, and in a very few years beginning to suggest methods for extending the science. in 1665, he committed to writing his first discovery on fluxions; and to this year the popular tradition assigns the fall of the apple, as he sat in his garden at Woolsthorpe, which suggested the most magnificent of his discoveries—the law of universal gravitation. On his first attempt, however, by means of the law so suggested to his mind, to explain the lunar and planetary motions, he employed an estimate then in use of the radius of the earth, which was so erroneous as to produce a discrepancy between the real force of gravity and that required by theory to explain the motions, corresponding to the respective figures 16·1 and 13·9. He accordingly abandoned the hypothesis for other studies. These other pursuits to which he thus betook himself, consisted chiefly of investiga-



NEWTON.

tions into the nature of light, and the construction of telescopes. By a variety of ingenious and interesting experiments on sunlight refracted through a prism in a darkened apartment, he was led to the conclusion that rays of light which differ in color, differ also in refrangibility. This discovery enabled him to explain an imperfection of the telescope not till then accounted for. The indistinctness of the image formed by the object-glass was not necessarily due to any imperfection of its form, but to the fact of the different colored rays of light being brought to a focus at different distances. He concluded rightly that it was impossible for an object-glass consisting of a single lens, to produce a distinct image. He went further, and too hastily concluding, from a single experiment, that the dispersive power of different substances was proportional to their refractive power, he pronounced it impossible to produce a perfect image by a combination of lenses. This conclusion—since proved erroneous by the discovery of the achromatic telescope by Chester More Hall, of More Hall, in Essex, about 1729, and afterward independently, by Mr. Dollond 1751—turned N.'s attention to the construction of reflecting telescopes; and the form devised by him is the one which, at later periods, reached such perfection in the hands of Sir William Herschel and Lord Rosse.

1671, Jan. 11, N. was elected a member of the Royal Soc. having become known to that body from his reflecting telescopes. At what period he resumed his calculations about gravitation, employing the more correct measure of the earth obtained by Picard in 1670, does not clearly appear; but it was in 1784 that it became known to Halley that he was in possession of the whole theory and its demonstration. It was on the urgent solicitation of Halley that he was induced to commit to a systematic treatise these principles and their demonstrations. The principal results of his discoveries were set down in a treatise *De Motu Corporum*, and were afterward more completely unfolded in the great work *Philosophiæ Naturalis Principia Mathematica*, finally published about midsummer 1687.

Shortly before the *Principia* was given to the public, N. had been called to take an active part in defending the rights of the university against the illegal encroachments of James II. His prominence on that occasion procured him a seat in the Convention Parliament, in which he sat from 1689, Jan., to its dissolution 1690. In 1696 he was appointed warden of the mint, and was promoted 1699 to the lucrative office of master of the mint, which he held till the end of his life. He again took a seat in parliament, 1701, as representative of his university. Thus engaged in the public service, he had little time left for mere scientific studies—pursuits which he always held of secondary importance to his public duties. In the interval of public duty, however, N. showed that he still retained the scientific power by which his great discoveries had been made. This was shown in his solution of

two celebrated problems proposed, 1696 June, by John Bernouilli, as a challenge to the mathematicians of Europe. A similar mathematical feat is recorded of him so late as 1716, in solving a problem proposed by Leibnitz, for the purpose, as he expressed it, of feeling the pulse of the English analysts. When in parliament, N. recommended the public encouragement of the invention of a method for determining the longitude—the first reward in consequence being gained by John Harrison for his chronometer. N. was pres. of the Royal Soc. from 1703 till his death, 25 years, being each year re-elected. In this position, and having the confidence of Prince George of Denmark, he was able to do much for advancement of science; and one of his most important works was the superintendence of the publication of Flamsteed's *Greenwich Observations*—a task, however, not accomplished without much controversy and some bitterness between himself and that astronomer. The controversy between N. and Leibnitz, as to priority of discovery of the differential calculus, or the method of fluxions, was raised rather through the partisanship of jealous friends, than through the anxiety of the philosophers themselves, who were, however, induced to enter into and carry on the dispute with some degree of bitterness and mutual recrimination. The verdict of the impartial historian of science must be, that the methods were invented quite independently, and that, although N. was the first inventor, a greater debt is owing by later analysts to Leibnitz, on account of the superior facility and completeness of his method. The details of these controversies, with all other information of the life of this philosopher, are admirably collected in the *Life* by Sir D. Brewster, who writes with not only an intimate acquaintance with N.'s works, but in the possession of all the materials collected in the hands of his family. N.'s remains received a resting-place in Westminster Abbey, where a monument was erected to his memory 1731. A magnificent full-length statue of the philosopher, executed by Roubilliac, was erected 1755, in the antechapel of Trinity College, Cambridge. This work was assisted by a cast of the face taken after death, preserved in the university library at Cambridge. In 1699, N. had been elected a foreign associate of the Acad. of Sciences and 1703, he received the honor of knighthood from Queen Anne. Among the best editions of N.'s principal works are the quarto edition of the *Optics* (Lond. 1704), and the quarto edition of the *Principia* (Cambridge, 1713).

NEWTON, John: clergyman of the Eng. Church: 1725, July 24—1807, Dec. 31; b. London. He is best known as the author of immortal hymns, everywhere sung, such as 'Glorious Things of Thee are Spoken,' 'Come, my Soul, thy Suit Prepare,' 'Savior, Visit thy Plantation,' and 'How Sweet the Name of Jesus Sounds.' His life was remarkable. Son of a ship-master (who was finally gov. of York Fort, Hudson's Bay, and died there

1750), N. lost by death his pious mother, a dissenter, when he was 7 years old; and his only schooling was from his eighth to his tenth year. The following year, and until he was 17 years of age, he served at sea under his father. Soon after he was impressed for service on the man-of-war *Harwich*, became midshipman, but was degraded and disciplined with severity after an effort to desert. He obtained an exchange to an African merchantman, and met such hardships that his father brought him back to his own vessel. Taking position as mate on a Liverpool slave-ship he learned to abhor the slave-trade, and this, with poor health, led him to the post of tide-surveyor at Liverpool. Meanwhile, he had married, and had begun to educate himself in mathematics, Latin, French, Greek, and Hebrew. Having by a remarkable conversion entered on a Christian life, he applied in vain at the age of 33 for admission to the Christian ministry; and not until six years subsequently was he ordained in the Church of England, accepting the curacy of Olney. In 1767 the poet Cowper settled in that parish, and became an intimate friend of the curate. Together, they published the *Olney Hymns*, 1779, and in the same year N. left to become rector of St. Mary Woolnoth, London. After 8 years of faithful work in this parish, he died. In theology, he was Calvinistic, but sympathized with the spirit of Methodism. He wrote a narrative of his life; and his works, such as sermons, letters on religion, etc., pub. in 6 vols., 1816, passed through many editions, though they are now little read.

NEWTON, JOHN: born Norfolk, Va., 1823, Aug. 24. He graduated from the U. S. Milit. Acad. 1842, became asst. professor of engineering at West Point, was engaged in various sea-coast fortifications, and 1858 was chief engineer of an expedition to Utah. At the opening of the civil war he had reached the rank of capt., was promoted 1861 brig.gen. vols., and placed in command of the defensive works at Washington. He was in the Peninsula campaign; in the battles of South Mountain and Antietam; commanded a division at the battle of Chancellorsville; and was promoted maj.gen. vols., 1863. On the death of Gen. Reynolds he succeeded to the command of the 1st corps at Gettysburg. He took part in the Atlanta campaign, commanded various posts in Fla.; and before being mustered out of the vol. service, 1866, had been brevetted brig.gen. and maj.gen. in the army. He became chief of engineers with rank of brig.-gen., 1884. Under his direction the obstructions in the Hell Gate channel in New York harbor were removed. The work was in progress several years, was entirely successful, and ranks with the great engineering feats of the age. At his own request N. was retired, 1886, Aug. 27. The following day he became commissioner of public works for New York. This office he resigned, 1888, Nov. 24. He was a member of the National Acad. of Sciences, and 1884 was made an honorary member of the American Soc. of Civil Engineers. Hed. in N. Y. city, 1895, May 1.

NEWTON, Richard Heber, D.D.: Prot. Episc. clergyman: b. Philadelphia, 1840, Oct. 31; son of Richard N., D.D. He was educated at the Univ. of Pennsylvania and the Prot. Episc. Divinity School, Philadelphia; was ordained deacon, 1860, priest, 1866, and assisted his father at the Church of the Epiphany, in Philadelphia, for four years. He was in charge of a church in Sharon Springs, N. Y.; rector of St. Paul's Church, Philadelphia; and 1869 became rector of the All Souls, or the Anthon Memorial Church in New York, which position he still (1890) holds. He is noted for the freedom of his pulpit utterances and for his interest in social and political reforms. The degree D.D. was conferred upon him by Union College 1881. Among his books are *Children's Church*, a Sunday-school service and hymn book; *The Morals of Trade; Womanhood; Right and Wrong Uses of the Bible*, two editions; *Book of Beginnings; Philistinism;* and *Social Studies.* Some of these works have been printed also in England.

NEWTON, Robert, D.D.: Wesleyan minister: 1780, Sep. 8—1854, Apr. 30; b. Roxby, Yorkshire, England. He received only a limited education, joined the Wesleyan Church when 17 years of age, and the following year began to preach. He soon afterward became a member of the British conference. While holding appointment to the Glasgow circuit, 1803, he attended the theological and philosophical lectures at the university. He labored with great success in various portions of Scotland and England. In London, 1812, he presented the claims of the British and Foreign Bible Soc., and attracted immense crowds by his eloquence. There was constant call for his services in the large cities and towns of Great Britain and, largely through his influence, the denomination made a wonderful growth in numbers and influence. He served four times as pres. of the British conference, was its sec. many years, and its delegate, 1839, to the gen. conference of the Meth. Episc. Church in the United States, where he was received with great enthusiasm. He preached to large crowds in New York, and is said to have had an audience of 15,000 people in the Monument Square, Baltimore. For half a century he was almost incessantly travelling and laboring in the interests of religion. His *Life* was published, London, 1855; and a vol. of his sermons appeared the following year.

NEWTON, Thomas: English prelate: 1704, Jan. 1—1782, Feb. 14; b. Lichfield. He was educated at Westminster School and afterward at Trinity College, Cambridge, where he took the degree M.A. 1730, in which year also he was ordained priest. After holding several minor preferments he was made Bp. of Bristol, 1761. Without any remarkable merit N. has obtained a place in literary history by his edition of *Milton's Paradise Lost* (2 vols. 1749), and *Dissertations on the Prophecies* (3 vols. 1754-58). He wrote also a host of scriptural dissertations of little value.

NEW'TON, WILLIAM WILBERFORCE: Prot. Episc. clergyman: son of Richard N., D.D.: b. Philadelphia, 1843, Nov. 4. He graduated from the Univ. of Pennsylvania, 1865, studied in the Prot. Episcopal Divinity School, Philadelphia, became deacon, 1868, and priest, 1869. During his father's absence he ministered for two years to the Church of the Epiphany in Philadelphia; was rector of St. Paul's Church, Brookline, Mass., 1870–75; of Trinity Church, Newark, N. J., two years; of St. Paul's Church, Boston, four years; and since 1881 of St. Stephen's Church, Pittsfield, Mass. He originated the idea of the American Congress of Churches, which held its first meeting, 1885, in Hartford. He is noted for evangelical earnestness and a broadly liberal spirit. In addition to cantatas, he has written *Little and Wise; Essays of To-day; The Palace Beautiful; Priest and Man; Paradise; Prayers of the Ages; Ragnar, the Sea-King;* and several other books.

NEW'TON-AB'BOT: market town of England, county of Devon, beautifully situated in a vale on the river Lemon, 15 m. s.s.w. of Exeter. The portion of the town called Newton-Bushel is on the left side of the stream. N.-A. has been undergoing considerable improvements within recent years, being attractive to residents by its scenery and its salubrity. William of Orange, after landing at Torbay, 1688, made his first public declaration here. Pop. 12,500.

NEWTONIAN, n. *nū-tō'nĭ-ăn:* a follower of *Newton's* philosophy; ADJ. pert. to Sir Isaac Newton, or to his discoveries or system.

NEW'TON-IN-MAK'ERFIELD, or NEW'TON-LE-WIL'LOWS: thriving manufacturing and market town of England, in Lancashire, 15 m. w. of Manchester, on the Manchester and Liverpool railway. Two large iron foundries, as well as printing, paper, and sugar works, an oil-distillery, and a brick, tile, and pot manufactory are in full operation. There is a beautiful lake in the town, called Newton Mere, a summer pleasure-resort. Horse-races are held here in June, and horse and cattle fairs in May and Aug., annually. Cotton and flour mills, iron foundries and glass-works are in operation; and bricks are made. Pop. 16,700

NEW'TON'S RINGS: apparently, modifications of the colors of the spectrum, and exhibiting the colors produced by a film of air; invented by Sir Isaac Newton in his investigations of the colors produced by thin plates of any material, solid, fluid, or gaseous. He took two lenses, one convexo-plane, its convex side having a radius of 14 ft., the other equi-convex, with the radii of its surfaces 50 ft., and laid the first with its plane surface downward on the top of the second, thus producing a thin film of air between the lenses; the film being thinnest near the centre, and becoming gradually thicker outward. On slowly pressing the upper lens against the under one, a number of concentric colored rings, having

the point of contact of the lenses for their centre, appeared, and increased in size when the pressure was increased. These rings, or more properly systems of rings, are seven in number, and each is composed of a number (ranging from eight in the first or smallest ring, to two in the outermost) of rings of different colors, the colors, though different in each of the systems of rings, preserving the same arrangement as the colors of the spectrum, of which they seem to be modifications; thus, in the second ring the inside color is violet, and the outside scarlet red. The colors are very distinct in the first three systems of rings, but become gradually confused and dull toward the outside, till they almost fade away in the seventh system. The centre is deep black. The thickness of the air-film at the centre is about half a millionth of an inch, and increases gradually to nearly $\frac{1}{130,000}$ of an inch, when the colors disappear.

NEWTON THEOLOGICAL INSTITUTION: Baptist seminary at Newton Centre, Mass. Its three buildings, two of which are dormitories, are on a commanding eminence. The pres. of a faculty of seven is Alvah Hovey, D.D., LL.D.; and the students numbered, the last year: seniors 14, middle class 16, juniors 15, unclassified 11; total, 56. There is an English course for non-graduates of colleges. The library has 18,000 vols. Special aid is offered by 27 scholarships of $1,000 each, the interest on which is distributed annually, and by the Gardner Colby fund of $10,000. A large meeting of ministers and laymen, 1825, resolved to establish the seminary, and its first session opened in Nov. of that year under Irah Chase, D.D., who, with J. Ripley, D.D., was the only instructor for six years. From 1834 to 38 were added James D. Knowles, D.D., Barnas Sears, D.D., LL.D. (afterward pres. of Brown Univ.), and Horatio B. Hackett, D.D. All these men became noted by their writings. After years of discouragement, $100,000 for endowment was raised, and to this $200,000 was subsequently added. As long since as 1883, 700 students had been graduated, of whom 60 became foreign missionaries, and 55 teachers in colleges and theol. institutions.

NEW'TON-UPON-AYR, *-ăr* or *-ār:* burgh of barony and parish of Scotland, county of Ayr, on the n. side of the river Ayr, and united witht he town of Ayr by three bridges: see AYR. N. has ship-building docks, roperies, and iron and brass foundries, and exports 100,000 tons of coal annually. Its pop. is included in that of Ayr.

NEWTOWN, *nū'town:* town and boro. in Fairfield co., Conn.; on the Housatonic, and the New York and New England railroads, 19 m. n.w. of Bridgeport, 9 m. e. of Danbury. It has 3 churches, is the seat of an acad., has a savings bank, and a weekly newspaper. There are wagon and carriage factories, saw-mills and grist-mills, comb and button factories, and a hat shop. The town is on an elevation, from which a fine view is obtained. Pop. (1880) 4,013; (1900) 3,276; (1910) 3,012.

NEW'TOWN: former vill. and tp. in Queens co., in the extreme w. of Long Island, N. Y.; on the Long Island railroad, 3 m. from Flushing, 5 m. from Jamaica, and 5 m. from New York. The n.e. portion is washed by an estuary of Long Island Sound, the East river flows on the n.w., and the city of Brooklyn joins it on the west. Hunter's Point and Astoria have been set off, but there are now six or eight villages within the tp. limits. There are more than 20 churches; excellent schools; and 3 weekly newspapers, one in German. The manufactures include straw hats, china, and oil-cloth, a large iron foundry, and rope-walks. Market-gardening is extensively conducted. N. became a part of the city of New York 1898, Jan. 1.

NEW'TOWN: suburban municipal dist. of Sydney, New South Wales. It is a residence suburb, with houses of the better class, and has close communication with Sydney. Pop. 22,600.

NEW'TOWN: modern manufacturing town of N. Wales, county of Montgomery, 8 m. s.w. of the town of Montgomery, on the right bank of the Severn, and on the Montgomery canal, which connects it with the inland navigation of the country. It is the centre of the flannel manufactures of the county. It has many large factories, employing over 1,000 men. Pop. 6,600.

NEWTOWNARDS, *nū-tn-ârdz'*, or NEWTOWNARDES: market-town of county Down, Ireland, 12 m. e. from Belfast by railway. It contains a court-house, a town-hall, and a market-square; a Prot. Episc. church, a Rom. Cath. chapel, seven Presb. churches, numerous schools, and a union workhouse. It is a neat and well-built town, in a charming situation, of considerable trade, and with extensive muslin, flax-spinning, and weaving factories. Pop. 9,200.

NEW'TOWN-LIMAVADY, *-lĭm-a-văd'dĭ* (Ir. *Leim-a-ma-dha*, 'The Dog's Leap'): market-town of county Londonderry, Ireland, 16 m. e.n.e. of the town of Londonderry. Pop. in 1881, 2,954. N.-L., before the establishment of English rule, was the seat of the powerful sept of the O'Cahans, or O'Kanes; and during the wars of the Revolution it was the scene of more than one struggle between the followers of James II. and those of William. Its chief importance at present is as a centre of the flax trade, important in that district. It possesses a town-hall, weaving factory, extensive flour-mills, markets, and brewery; union workhouse, Prot. church and other places of worship, and two comfortable inns. Pop. 3,000.

NEW ULM: Minn., city, county-seat of Brown co.; on the Minnesota river, and on the Minneapolis & St. L. and the Chicago & N. W. R.R.'s; about 80 m. in direct line w. by s. of Saint Paul, and 25 m. w. by n. Nankato. It was settled in 1857 by a German land company, incorporated in 1870, and chartered as a city in 1876. It was the scene of an Indian massacre in 1862. It is in a

productive agricultural region in which there is considerable attention given to stock-raising. Its chief industrial establishments are flour mills, breweries, cigar factories, a creamery, a cooperage, machine-shops, a pottery, brick and lumber yards, and grain elevators. The mills have about 175 employees; the cigar factories, about 70; the breweries, 75; and the brick yards, 50. It has an extensive trade in farm products and live-stock. There are five churches, and the educational institutions are public and parish schools, Dr. Martin Luther College, Saint Michael's Academy, a public school library, and the Turnverein Library. The three banks have a combined capital of $170,000, and the annual business is about $15,000,000. The government, under a revised charter of 1891, is vested in a mayor, who holds office two years, and a council. The electric-light plant and the waterworks are owned and operated by the city. The majority of the inhabitants are German or of German descent. Pop. (1900) 5,403. 5,403; (1910) 5,648.

NEW WESTMINSTER: Canada, city in the Province of British Columbia, situated on the north bank of the Fraser River about 16 miles from its mouth in the Gulf of Georgia; on the line of the Canadian Pacific Railway, and the Great Northern Railway; 12 miles from Vancouver, and 75 miles from Victoria on the Island of Vancouver. It is connected with Vancouver by an electric railway.

Industries and Business Interests.—The chief industries are lumbering, the salmon fisheries and canneries, oatmeal, machine and boiler shops, foundry, fruit canning factory, cold storage works, carriage works, creameries, shingle mills, wood-pipe works, glass works, tannery, wooden shoe-heel factory, brewery, distillery, and car shops. Steamers run up the river about 60 miles several times a week, and daily down the river to Ladner and Steveston, and to Victoria three times a week. The exports of New Westminster in 1905 were $2,753,713, the imports $858,596, and the total customs revenue $165,231.

Institutions, Buildings, Etc.—The debt of the city is $1,087,000, of which nearly one half was incurred in the construction of the water-works system. The gross city assessment for 1905 was $4,821,630, and the net taxable assessment was $3,402,260. The city has 13 churches, two colleges, four public and two private schools, one high school, two hospitals, one provincial gaol, one penitentiary, one asylum for the insane, and three banks. It owns the electric light and water systems and also contains the county buildings and the supreme court offices. Some of the chief buildings are the customs house, post office and Columbian College.

History, Population, Etc.—The city was founded in 1859 by Colonel Moody, of the Royal Engineers, and was selected as the first capital of the colony, with the early designation of Queensborough. In 1860 municipal gov-

ernment was established. In 1873 New Westminster was incorporated as a city. A serious drawback was the great fire in September 1898, which destroyed the whole business portion of the city, and a considerable portion of the residential section, with a loss of some $3,000,000. The population is estimated at 8,000.

NEW YEAR'S DAY: first day of the year. The custom of celebrating this day by some religious observance, generally accompanied by festive rejoicing, appears to have prevailed among most of the ancient nations. The Jews, the Egyptians, the Chinese, the Romans, and the Mohammedans, though differing as to the time from which they reckoned the commencement of the year, all regarded it as a day of special interest. In Rome, the year anciently began in March; and when Numa, according to the ancient legend, transferred it to Jan. 1, that day was held sacred to *Janus Bifrons*, who was thus supposed to turn at once back upon the old year and forward into the new. On the establishment of Christianity, the usage of a solemn inauguration of the New Year was retained; but considerable variety prevailed, both as to the time and as to the manner of its celebration. Christmas Day, the Annunciation (Mar. 25), Easter Day, and Mar. 1, all have, at different times or places, shared with Jan. 1 the honor of opening the New Year; and not till late in the 16th c., was Jan. 1 universally accepted as New Year's Day. The early fathers—Chrysostom, Ambrose, Augustine, Peter Chrysologus, and others—in reprobation of the immoral and superstitious observances of the pagan festival, prohibited in Christian use all festive celebrations; and, on the contrary, directed that the Christian year should be opened with a day of prayer, fasting, and humiliation. The mandate, however, was but partially observed. The festal character of the day, generally speaking, was pertinaciously preserved, but the day was observed as a day of prayer also; and this character was the more readily attached to it when the year began with Jan. 1, as that day, being the eighth after the nativity of our Lord, was held to be the commemoration of his circumcision (Luke ii. 21).

The social observances of New Year's Day appear to have been in substance the same in all ages. From the earliest recorded celebration, we find notice of feasting and interchange of presents as usages of the day. Suetonius alludes to the bringing of presents to the capital; and Tacitus makes a similar reference to the practice of giving and receiving New Year's gifts. This custom was continued in the Christian kingdoms into which the Western Empire was divided. In England we find many examples of it, even as part of the public expenditure of the court, as late as the reign of Charles II.; and the custom of interchanging presents was common in all classes of society. In France it still subsists, also in England and the United States to a small extent, though eclipsed in the latter countries by the far more popular

custom of Christmas gifts. In many countries, the night of New Year's Eve, 'St. Sylvester's Eve,' was celebrated with great festivity, which was prolonged till after 12 o'clock, when the New Year was ushered in with congratulations, complimentary visits, and mutual wishes for a happy New Year. This is an ancient Scottish custom, which prevails in many parts of Germany also, where the form of wish—'Prosst (for the Lat. *prosit*) Neujahr'—'May the New Year be happy'—attests the antiquity of the custom. In many places, the practice of tolling bells at midnight, and thus 'ringing in the New Year,' is still observed. Many religious communions are wont to celebrate it with a special service. In the Rom. Cath. Church, the *Te Deum* is still sung at the close of the old year, and New Year's Day is a holiday of strict obligation. Methodist and some other churches hold a 'watch-night service' on the eve of New Year's Day, through the last three hours of the departing year.

The day was more or less observed among the American Indian tribes. The Moqui celebration, called So-yal-u-na, is largely a presentation of a singular and elaborate mythic drama, divided into two parts, in which offerings are made to effigies of the great plume headed serpent, the enemy of the sun, followed by a sun dance, in which the conflict between the sun and the inferior hostile gods is admirably portrayed by Moqui men personifying the various deities.

In the United States it has always been the custom of the Presidents to receive on New Year's day. In 1790, when New York was the seat of government, Washington held a reception between the hours of 12 and 3 and was visited by all the home and foreign dignitaries. He expressed the hope on that occasion that whatever change might take place in the manners and customs of the city the observance of New Year's day might never be given up. In New York and other cities there are services in many churches and receptions in many clubs and drawing rooms. The formal custom of receiving New Year's calls has nearly become obsolete in our larger cities, it having been superseded by the regular afternoon and informal evening receptions, to which gentlemen take more kindly than to the old-fashioned New Year's party. The good old Knickerbocker custom is still maintained by some families. Some give formal dinners, and in the country carriage loads not infrequently go round from house to house making merry calls, picking up additions to the party and finally ending with supper at some hospitable house and in an evening with games, refreshed by apples, roast chestnuts, plum cake and sweet cider. The day was not observed in Colonial times with the formality which has marked its observation in later years. After the Colonies had adjusted business affairs to the new date, the first of January grew in importance and in course of time became a legal holiday. See CALENDAR.

NEW YORK, *nū yawrk′:* state, one of 13 original states in the Amer. Uñion; ranking (1910) first in population, manufactures, commerce, imports and exports, banking capital and aggregate wealth; second in agriculture and mineral productions (excluding the precious metals). Though not first in railroad mileage, her roads (including those which land their goods at the metropolis of the state and nation) rank first in the volume of business done; popularly known as the Empire State: named in honor of the Duke of York.

Location and Area,—N. Y. is in lat. 40° 29′ 40″—45° 0′ 42″ n., long, 71° 51′—79° 45′ w.; bounded n. and n.w. by the Dominion of Canada, also by Long Island Sound; e. by Vt., Mass., Conn., lower New York Bay, and the Atlantic Ocean; s. by N. J., Penn., the lower bay, and Atlantic Ocean; w. by Penn., Lakes Erie and Ontario, and Niagara river; greatest length e. and w. (including Long Island) 412 m.; greatest breadth n. and s. 311 m.; two-thirds of boundaries navigable water; water frontage 880 m.; 49,170 sq. m. (31,468,800 acres); cap. Albany.

Topography.—In the portion n. of the Mohawk river and Erie canal are 6 distinct ranges and 2 lesser ridges of mountains, all trending from n.e. to s.w.; in the portion s. of this line are 3 distinct ranges and a series of terraced plateaus. The ranges are: (n.) the Palmertown from Whitehall to the s. part of Saratoga co.; Luzerne, from Ticonderoga to Montgomery co.; Adirondack, from Point Trembleau (Lake Champlain) to the Mohawk river; Au Sable, from Au Sable river (Lake Champlain) to within Montgomery co.; Chateaugay, from Lake Champlain to Herkimer co. and the Mohawk river; St. Lawrence, 10 m. n. and parallel with the Chateaugay: (s.) Highlands of Orange and Rockland cos., terminating at the Hudson river; Shawangunk, along the valley of the Rondout river; Catskills, near the Mohawk river; and the Blue or Delaware, rising in Sullivan and Delaware cos. The plateaus rise from Lake Ontario and the Ridge Road, the first extending to Niagara river above the Falls, the second to the Genesee Falls, and then rising to the adjacent summit level. Near the St. Lawrence ridge is the Black River Highlands, and between it and the Mohawk river Hasenclever ridge. The Adirondack range contains the highest peaks in the state, Mt. Marcy, 5,402 ft., Mt. McIntyre, 5,201 ft., Gothic and Basin nearly 5,000 each, Mt. Dix. 4,916, Mt. Seward 4,384, and Mt. Santanoni, 4,644. Other summits, belonging to the Hudson Highlands, and familiar to travellers along the Hudson river, are: Butter Hill, Crow Nest, Bear, Anthony's Nose, Breakneck, Beacon Hill, and Dunderberg. The principal rivers are the Hudson, navigable from New York to Troy, 160 m., and famed for the rugged magnificence of its scenery, particularly between New York and West Point; the Mohawk, chief tributary of the Hudson, 135 m. long; the St. Lawrence, which forms the n. boundary of the state for nearly 100 m.; the Oswego, which re-

ceives the waters of the cluster of interior lakes; the Black and Genesee rivers, emptying into Lake Ontario: the Buffalo, emptying into Lake Erie; the Oswegatchie, Grasse, and Raquette, affluents of the St. Lawrence; Chazy, Saranac, Au Sable, and Wood creek, emptying into Lake Champlain; and the Niagara, connecting Lakes Erie and Ontario. Portions of the state also are drained by the Alleghany, Delaware, and Susquehanna rivers. The lakes comprise the e. end of Erie and half of Ontario and Champlain on the boundaries, and George, Schroon, Oneida, Onondaga, Otisco, Skaneateles, Owasco, Cayuga, Seneca, Crooked, Canandaigua, Hemlock, Silver, Chautauqua, the Upper and Lower Saranacs, Moose, and more than 200 others. The falls include Niagara, Trenton, Watkins, Taghkanic, Genesee, High, Chittenango, Kaaterskill, Au Sable, Ticonderoga, Lyon's, Bakers, and Cohoes. The leading islands are Manhattan, containing the central part of New York; Long Island; Staten Island; Randalls, Ward's, Blackwell's Governor's, and Davids, near New York; Coney, Fire, and Shelter Islands along the coast; and more than 1,000 in the lakes and in the St. Lawrence and Hudson rivers. New York has a grand harbor, approached through the lower and upper bays, Long Island Sound, Staten Island Sound, and the East river; there are several bays on Lake Ontario, and two notable harbors on Lake Erie—Buffalo and Black Rock.

Climate.—The climate is generally healthful, with mean temperature 46–49°, mean maximum of heat 92°, mean minimum, —12°, mean fall of rain and snow 40·93 inches, annual range of thermometer 104°, mean length f season of vegetation 174 days.

Geology.—The geological series of N. Y. ranges from the oldest paleozoic rocks to the lowest representatives of the carboniferous system, and is known geologically as the New York System. The Laurentian system, containing ancient crystalline rocks, predominates in the Adirondack region, and shows gneissoid, granitic, labradorite, and hypersthene rocks. The Laurentian is followed by the Potsdam Sandstone system, above which is calciferous sandstone. The Trenton group nearly encircles the Laurentian system, other prominent groups are the Utica slate and Hudson river, Shawangunk conglomerate, Oswego gray sandstone, Medina sandstone, Clinton and Niagara groups, water lime and salt groups, upper and lower Oriskany sandstone, Hudson river blue stone, Catskill red sandstone, and Onondaga salt group. The economic properties are magnetic, red, brown hæmatite, specular, and bog-iron ores; lead ore; some zinc, copper, manganese, and barytes, salt, sulphur, chalybeate, magnetic, and other mineral and medicinal springs; granite; white and colored marbles; gray and blue limestones; slate, flagstones, and trap-rock for street paving; and natural gas, in Chautauqua, Dutchess, Oneida and Monroe cos. The forests show 12 species of pine, 15 of oak, 5 of maple, 4 of hickory,

and 3 each of ash, birch, and elm. A few years ago a large portion of the state was covered with valuable forests, but the destruction of trees was so great that the legislature was forced to check the wantonness, and to enact most stringent laws prohibiting the further incursions of lumbermen in order to preserve the forests that were left, especially in the Adirondack region. The greater part of the soil is arable, and more than two-thirds of the farm lands are improved and under high cultivation. St. Lawrence, Delaware, Chenango, Chautauqua, Jefferson, and Orange cos. comprise the great dairy region; Oneida, Madison, Otsego, and part of Chenango cos. the hop region; the islands of the Hudson and of the lakes in the central part of the state, the grape districts; Long Island the market-gardening; and the mountainous regions, the best grazing lands.

Zoology.—The state abounds in a variety of species of animals; among which are black bear, fallow deer, elk, moose, opossum, raccoon, wolverine, several martens, weazel, ermine-weazel, mink, otter, wolf, gray and black panther, gray and red fox, several lynx, seal, hooded-seal, walrus, whale, porpoise, grampus, beaver, rabbit, and several species of rat. The fisheries comprise river, lake, and sea, and yield white fish, shad, cod, mackerel, and menhaden for oil and guano. There are 6 orders of bony fishes and 3 of cartilaginous; 10 orders and 60 species of crustaceans; and 6 orders and numerous species of mollusks. A number of trout and deer preserves are maintained by organizations of sportsmen in the interior. The birds include birds of prey, of passage, swimmers, and waders. The turtle, lizard, and serpent tribes are represented by about 40 species, Oyster-planting is a large and growing industry.

Agriculture.—Until 1890 N. Y. ranked first in the value of its agricultural products, but since that time it has been surpassed by several of the Western States, particularly in the wheat and corn crops, many farms formerly given over to these crops in N. Y. being now utilized for the growing of hay and forage. At present there are about 250,000 farms in the state, comprising well over 25,000,000 acres, of which more than two-thirds is improved land. The total value of all farm property, including lands, buildings, and improvements, implements and machinery, and live stock, is about $1,100,000,000. The principal crops are corn, wheat, oats, barley, rye, buckwheat, potatoes, hay, and tobacco. Potatoes form the most important crop of all, N. Y. having more acres under potatoes than any other state. Market gardening is of considerable importance, practically all the farms along the Hudson, on Long Island, and in the counties surrounding N. Y. City being devoted to it. Fruit orchards, especially apples, are to be found along the Hudson, particularly in Ulster co. and in the Genesee Valley and west; grapes are cultivated extensively in the lake region in the central part; while dairying is also of importance.

Manufactures.—N. Y. ranks first among the states in

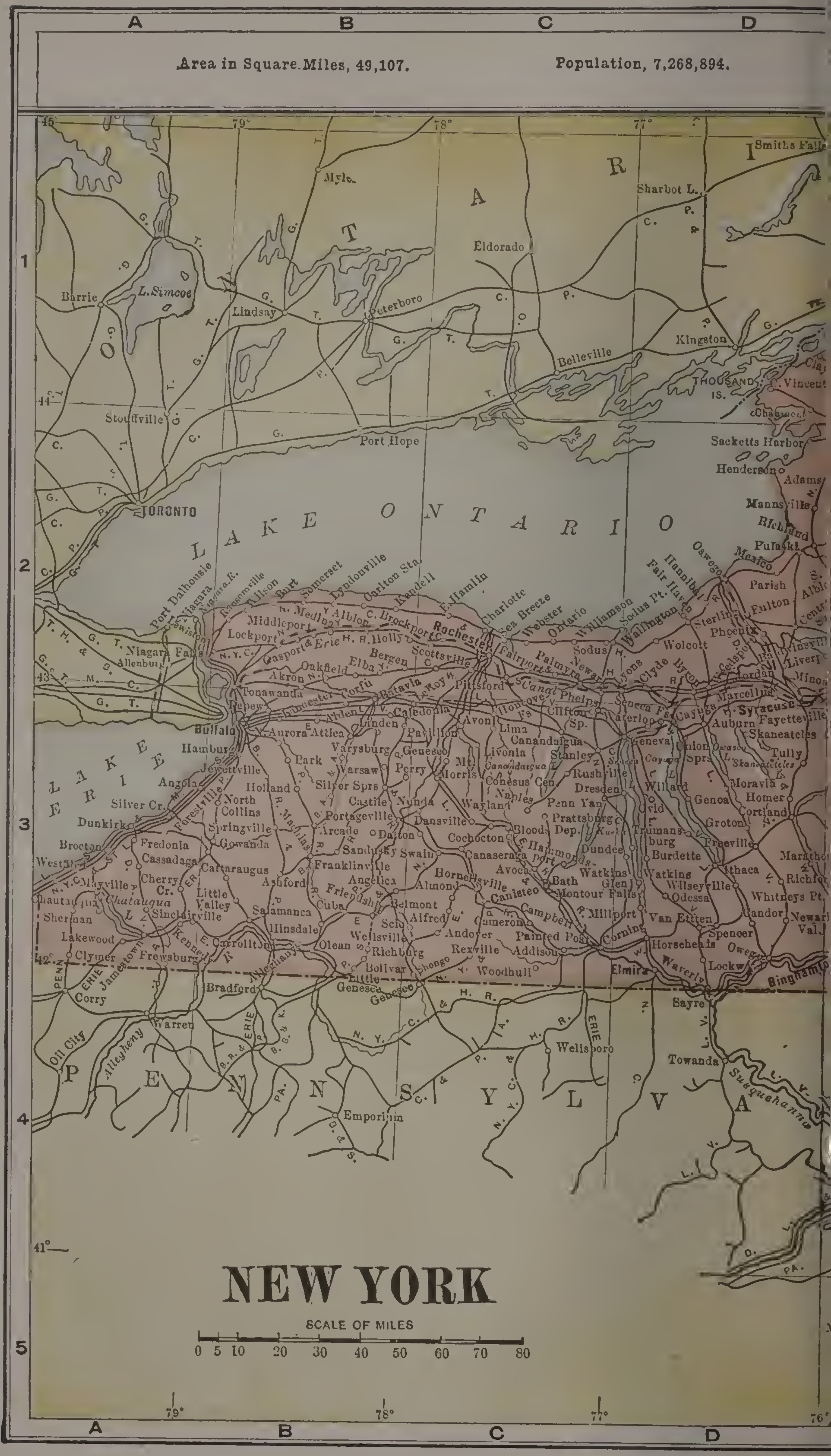
the value and importance of its manufactures and contains about one-sixth of all the manufacturing establishments in the country. Altogether there are almost 100,000 of these, producing materials whose aggregate annual value is about $3,000,000,000. The principal products are men's and women's clothing, foundry and machine-shop products, printing and publishing, textiles, sugar and molasses refining, liquors, slaughtering and meat packing, tobacco, lumber, and flour and grist-mill products. About three-fifths of the total product belongs to N. Y. City, the entire output of men's and women's factory-made clothing being produced there. Other industries show the same tendency to centralize about some one city, as the carpet, cotton, and shoe industries at Utica, the knitting industry at Yonkers and Cohoes, etc.

Fisheries.—Of these the oyster fisheries are the most valuable, producing over one-half of the total value, while menhaden, bluefish, and clams rank next in importance. The most important fisheries are along the coast of Long Island, where the oyster beds are particularly valuable. Trout are caught in large numbers in the Adirondacks, and shad and alewives in the Hudson, while the shell fish industry is constantly increasing, being valued at considerably over $10,000,000 in seed oysters, marketed oysters, clams, and lobsters. The value of the canned fish is well over $200,000.

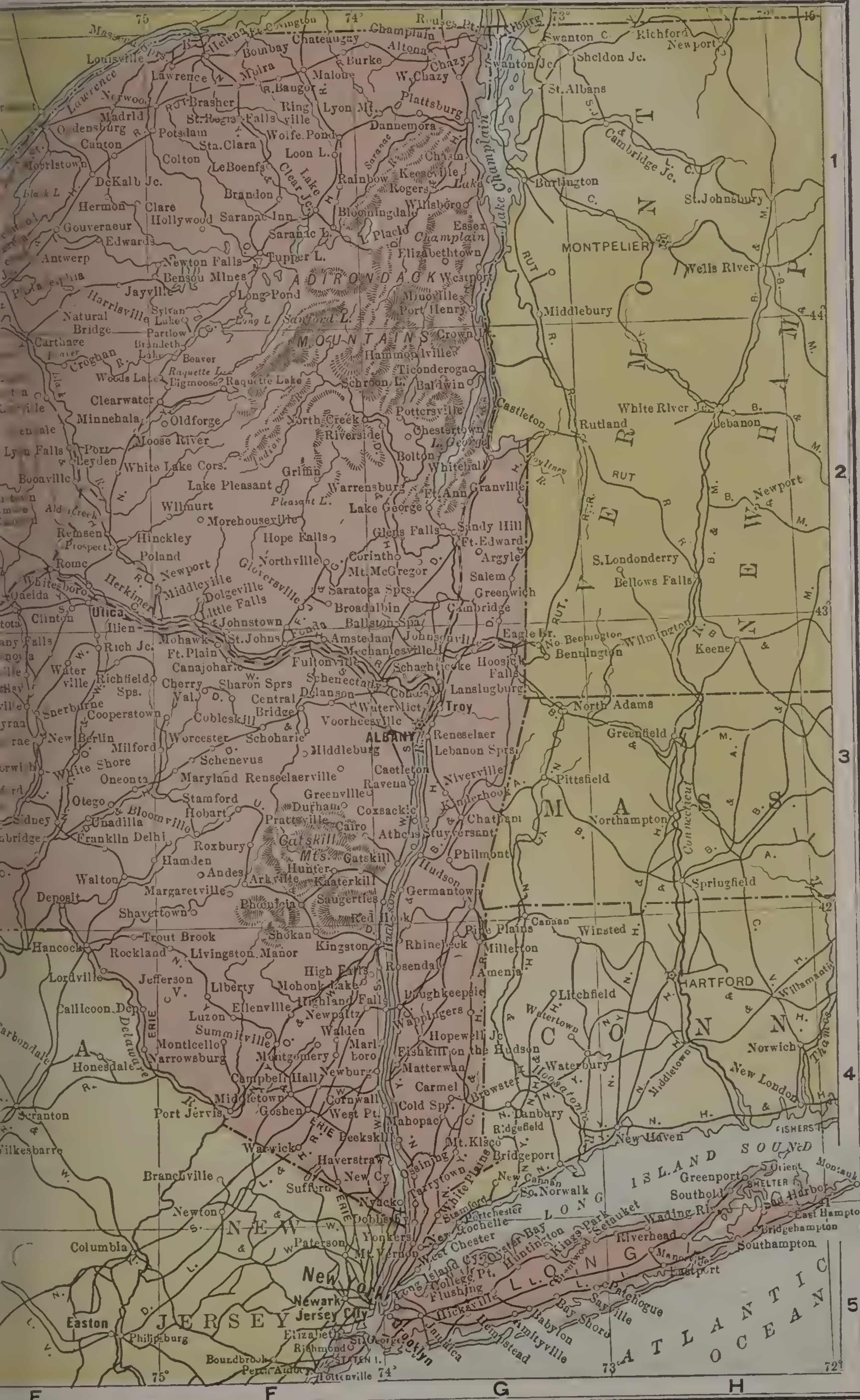
Shipbuilding.—There are about 300 shipbuilding establishments in the state, conducting a vastly profitable business. They produce iron, steel, and wooden vessels, besides canalboats, and numerous miscellaneous craft, their total annual output running up into the millions of tons.

Mining, Minerals, and Quarrying.—Salt, iron ore, sandstone, limestone, fireclay, marble, granite, and slate are the principal products of the mines of the state. Previous to 1893 Michigan ranked first as a producer of salt, but since that time N. Y. has taken her place. Gold has been found in small quantities in the Adirondack region, and the greatest deposits of hematite and magnetite are also in this region, while natural gas is found near Lake Erie. Coal has not been found in the state. The most valuable building stones are Catskill and Potsdam sandstone, Hudson river bluestone, and limestone. Rock salt is found in the vicinity of Warsaw, s. of Lake Ontario. The mineral springs are among the most valuable in the country.

Commerce.—By ocean, river, canal, and railroad N. Y. ranks first among the states in the volume of its foreign and domestic commerce. Over 35 per cent. of the total exports of the U. S. pass through the port of N. Y., and over 65 per cent. of the imports, while the commerce between the places in N. Y. state and other points in the Union is much greater than the foreign trade of the state. Altogether more than 7,500 vessels, totalling over 20,000,000 tons, enter and clear the port


Area in Square Miles, 49,107.
Population, 7,268,894.
NEW YORK
SCALE OF MILES
0 5 10 20 30 40 50 60 70 80
A B C D
1 2 3 4 5
79° 78° 77° 76°
45 44 43 42° 41°
LAKE ONTARIO
LAKE ERIE
ONTARIO
PENNSYLVANIA
THOUSAND IS.
Toronto
Barrie
L. Simcoe
Lindsay
Peterboro
Myle
Eldorado
Sharbot L.
Smiths Falls
Kingston
Belleville
Port Hope
Stouffville
Sacketts Harbor
Henderson
Adams
Mannsville
Richland
Pulaski
Mexico
Oswego
Parish
Fulton
Hannibal
Fair Haven
Sterling
Phoenix
Wolcott
Sodus
Sodus Pt.
Williamson
Ontario
Webster
Sea Breeze
Charlotte
Rochester
Hamlin
Kendall
Carlton Sta.
Lyndonville
Somerset
Burt
Wilson
Ransomville
Niagara
Port Dalhousie
Lewiston
Niagara Falls
Lockport
Middleport
Medina
Albion
Brockport
Holly
Gasport
Oakfield
Elba
Bergen
Scottsville
Pittsford
Fairport
Palmyra
Newark
Lyons
Clyde
Tonawanda
Depew
Buffalo
Akron
Corfu
Batavia
Le Roy
Lancaster
Alden
Caledonia
Linden
Aurora
Attica
Avon
Honeoye Falls
Victor
Canandaigua
Phelps
Clifton Sp.
Geneva
Seneca Falls
Waterloo
Cayuga
Auburn
Syracuse
Fayetteville
Skaneateles
Marcellus
Jordan
Baldwinsville
Liverpool
Minoa
Hamburg
Jewettville
Angola
Silver Cr.
Dunkirk
Brocton
Westfield
Fredonia
Cassadaga
Mayville
Chautauqua
Sherman
Lakewood
Jamestown
Clymer
Frewsburg
Falconer
Sinclairville
Cherry Cr.
Little Valley
Cattaraugus
Gowanda
Springville
North Collins
Holland
Park
Varysburg
Warsaw
Silver Sprs
Castile
Nunda
Perry
Geneseo
Mt. Morris
Pavilion
Livonia
Lima
Conesus
Wayland
Dansville
Portageville
Arcade
Dalton
Sandusky
Swain
Franklinville
Ashford
Salamanca
Hinsdale
Olean
Cuba
Friendship
Angelica
Belmont
Almond
Alfred
Scio
Wellsville
Richburg
Bolivar
Andover
Hornellsville
Canisteo
Canaseraga
Cohocton
Naples
Penn Yan
Prattsburg
Dundee
Hammondsport
Avoca
Bath
Watkins
Montour Falls
Campbell
Cameron
Painted Post
Corning
Addison
Rexville
Woodhull
Millport
Elmira
Horseheads
Waverly
Owego
Lockwood
Binghamton
Van Etten
Spencer
Candor
Ithaca
Freeville
Groton
Genoa
Dryden
Cortland
Homer
Moravia
Tully
Marathon
Richford
Whitneys Pt.
Newark Val.
Odessa
Willseyville
Burdette
Trumansburg
Ovid
Willard
Dresden
Rushville
Stanley
Union Sprs.
Little Genesee
Bradford
Corry
Warren
Oil City
Emporium
Wellsboro
Sayre
Towanda
Susquehanna

Number of Counties, 61. Capital of State, Albany.



of N. Y. annually, about three-fifths of which number is made up of American boats.

Railroads.—The first railroad in N. Y., the Mohawk & Hudson, from Albany to Schenectady (17 m.), was opened in 1831. To-day the State ranks among the great railroad states, having a total trackage of more than 8,500 miles, divided among the great lines of the East, including the N. Y. Central & Hudson River, the N. Y., New Haven & Hartford, the Pennsylvania, the Erie, the Lackawanna, the Delaware & Hudson, the Lehigh Valley, etc. The great trunk lines of the country make connections with all these roads. N. Y. City is the great railroad terminus of the state, with Buffalo an important second. Besides the many steam railroads there are about 110 lines of electric street, cable, horse, and elevated railways, their aggregate track amounting to over 3,500 miles.

Canals.—The principal canals of the state, with date of construction, are as follows: The Erie (q.v.), extending from Albany to Buffalo, built 1817–62, and the Champlain, Whitehall to Waterford, 1817–37; Oswego, Syracuse to Oswego, 1825–62; Cayuga and Seneca, Montezuma to Cayuga and Seneca lakes, 1825; Black River, Rome to Carthage, 1836–61; Genesee Valley, Rochester to Olean, 1837–40, with Dansville branch, Shakers to Dansville, 1840, and Millgrove extension, Olean to Millgrove, 1857–61; Chemung, head of Seneca lake to Elmira, 1830–33; Chenango, Utica to Binghamton, 1833–37, with extension from Binghamton to the Penn. state line, 1833–37; Oneida River Improvement, Three River Point to Brewerton, 1839–50; Oneida Lake, Oneida lake to South bay, 1832–36; Crooked Lake, Dresden to Penn Yan, 1830–33; and Baldwinsville, to Jack's Reef. The Delaware and Hudson extends from Honesdale, Penn., to Rondout, N. Y., 1826–28, and the Junction from Elmira, N. Y., into Penn. At the general election, 1903, Nov., the people voted an appropriation of $101,000,000 to enlarge the Erie canal.

Banks.—In 1782 the first bank in the state was incorporated as the Capital Bank of North America. N. Y. has always been to the fore in introducing improved banking methods, and to-day it is the recognized banking centre of the country. At present there are over 400 national banks, about 150 savings banks, nearly 100 trust companies, besides a large number of miscellaneous banks and safe deposit companies, as well as about 350 building and loan associations. The major share of all of these institutions is located in N. Y. City. It was in that city, too, that the system of clearing houses, now deemed essential, began in the '50s. To-day the conditions which govern commerce and finance have made the clearing house in that city practically the clearing house of the U. S., while important clearing house businesses are also carried on in the State at Buffalo, Albany, Rochester, Syracuse, and Binghamton.

Finance.—The total assessed valuation of property,

including both personal and realty property, is almost $10,000,000,000, and the bonded debt is $57,230,660.

Religion.—All Christian denominations and the Jews are well represented, having very numerous churches and large congregations. The Roman Catholic is the strongest denomination in the larger cities, while the Protestant sects have the strongest representation in the smaller cities, towns, and villages. Of the Protestant denominations the Methodist, Presbyterian, Baptist, Protestant Episcopal, Lutheran, and Congregationalist are the strongest.

Education.—The state spends nearly $55,000,000 a year in the maintenance of its public schools, in which there are over 1,350,000 pupils enrolled, and about 45,000 teachers. The training for teachers is given in state normal and training schools, a state normal college, and a large number of training classes located wherever the need appears to call for them. Besides the public and private normal schools, there are about 170 private scondary schools, numerous colleges and universities for men, co-educational colleges and universities, colleges and seminaries for women, and schools of technology, theology, law, medicine, music, dentistry, and pharmacy. Among the many institutions of higher education the most prominent are Columbia University, Syracuse University, N. Y. University, Colgate University, Cornell University, and the College of the City of N. Y. Among the colleges for women Barnard and Vassar are the most prominent. The U. S. Military Academy is at West Point. There are also many denominational schools and colleges.

Charities and Corrections.—The state prisons are situated at Auburn, Clinton (Dannemora), and Ossining (Sing Sing). There are state reformatories and houses of refuge at Hudson and Albion, and one for women at Bedford. The state penitentiaries are in Albany, Clinton, Kings, Erie, Monroe, and N. Y. co. The usual county, city, and town almshouses are maintained. Other state charitable institutions include a soldiers' and sailors' home at Bath; Craig colony for epileptics; home for feeble-minded women, Newark; home for orphan Indian children, Iroquois; industrial school, Rochester; home for feeble-minded children, Syracuse; home for soldiers' orphans, Oxford; hospital for crippled and deformed children, Tarrytown; a school for the blind at Batavia, etc. There are also a host of private and denominational charities, covering practically every phase of charitable work. Altogether the annual expenditure by the state board of charities is in the vicinity of $25,000,000.

Capital punishment is still in force in the state; death by electricity, since the year 1880, has been substituted for hanging, the method which was previously in vogue. Murder in the first degree is the only crime for which capital punishment is inflicted.

History.—Juan de Verazzano (q.v.), who discovered the bay of New York 1524, is believed to have been the

first white person within the present limits of the state. The second discovery was by Samuel Champlain, who ascended the St. Lawrence river, and 1609, July, entered the lake that bears his name. The third, and the one from which the settlement of the region by the whites is generally reckoned, was by Hendrik or Henry Hudson, who entered the bay of New York 1609, Sep. 9, and the river that bears his name three days afterward. As he was in the employ of the Dutch E. India Co. at the time, the country discovered by him was claimed by Holland and named New Netherlands. On his return, he narrated his adventures and described the portion of the new country that he had seen; and within a few months (1610), a vessel was dispatched from Amsterdam to seek trade with the American natives. These, in the vicinity of New York and Long Island, belonged to tribes of the Algonquin family, the Indians farther n. being Iroquois federated under the name of the Five Nations. The members of the first trading expedition spent much time in exploration, and became acquainted with the coast regions of Long Island, the present East river, the Sound, the Hudson river, N. J. coast, and a portion of the Delaware river. They were evidently sufficiently pleased with the new country to desire to remain, for they built two trading forts on the Hudson and several dwellings on Manhattan Island. Reports sent home by this party further excited the interest of the Dutch in the new country; and, spurred by this interest, the states-general (1614) voted special privileges to any company that would open and maintain trade with the natives, and the same year fitted out an expedition to promote exploration. The United New Netherlands Co. was organized under the authority of the states-general, and virtually had possession of the unoccupied territory between Canada and Va., till the expiration of their grant. The states-general refused them a renewal, and 1621 incorporated the Dutch W. India Co., which took possession of New Netherlands the following year, though the former co. continued trading for several years. The new co. erected Fort Nassau on the Delaware river and Fort Orange on the Hudson (site of Albany) 1623, and settled agricultural colonies at Fort Orange and on the w. coast of Long Island. The following year, Peter Minuit was appointed, by the states-general, director-gen. of New Netherlands, and on his arrival bought the entire island of Manhattan from the Indians for $24. In 1629 the Dutch W. India Co. decided to offer manorial possessions to all who might desire to purchase them; and under this act several very extensive tracts of land were sold to wealthy Hollanders. In 1633 Wouter van Twiller succeeded Minuit; and during his four years' administration he settled a new colony on the Connecticut river (site of Hartford), built a fort there, and greatly promoted the interests of all the colonists and of the co. Willem Kieft followed as director-gen.; and during his eight years of office the colonists experienced

their first serious trouble with the Indians, and witnessed the beginning of the long and bitter struggle with the English colonies on Long Island and in Conn., for possession of the country. Kieft's successor, Petrus Stuyvesant, assumed direction of affairs at a critical time; but his firmness and sense of justice enabled him to make peace with the Indians, though they had been exasperated to war by a wanton attack on several of their villages, in which more than 100 of their people had been massacred by the Dutch, under Kieft's orders. The settlement of the Indian war left Stuyvesant free to watch the English colonists on the Connecticut and the Swedes who had settled on the Delaware, while undertaking to administer public affairs more systematically. In 1655 he seized the Swedish territory and annexed it to New Netherlands. In 1664, Mar., Charles II. granted to his brother, the Duke of York, all the territory between the Connecticut and Delaware rivers; and in Aug. following, the English, under Col. Nicolls, marched upon New Amsterdam and demanded its immediate surrender, though there had been no declaration of war or other warning. As Stuyvesant was completely surprised, and wholly unprepared to contest the demand, he was compelled to comply.

On gaining possession of the country, the English changed the name of New Amsterdam to New York, and the new name was applied to the whole province also. In 1673, Aug., the Dutch recaptured the colony, but held it only till the following Feb., when it was restored to the English by treaty. In 1688 the province, with that of New England, was placed under the administration of Edmund Andros, with Francis Nicholson as lieut.gov.; 1689 Nicholson's harshness led to an insurrection, in which the govt. was seized and administered in the name of William and Mary by Jacob Leisler for two years; the same year the Five Nations invaded Canada, in revenge for a French expedition into the Seneca country from Canada, and slew more than 1,000 French settlers; 1690, Feb. 9, Schenectady was burned and nearly all its people killed by French and Canadian Indians; 1693 a French expedition attacked the Mohawks and captured many prisoners, but lost nearly all its members by cold before regaining Canada; and 1697, on the conclusion of peace between France and England, Gov. Frontenac of Canada determined to punish the Five Nations, but was prevented by the royal gov. of N. Y., Lord Bellamont. 1702–13 there were numerous border skirmishes. In 1731 the French built a fort at Crown Point on Lake Champlain, and 1731–54 built several others on Lake Champlain, the St. Lawrence river, and at Niagara. The English, in the mean time, had established fortified posts on the Hudson (Fort Edward) and on Lake Ontario (Oswego), besides Fort William Henry on Lake George. In 1755 the campaign of the English against the French was begun by Sir William Johnson marching a strong force

against Crown Point. He was attacked by the French, under Dieskau, at the head of Lake George, and nearly annihilated them. The following year the French captured and destroyed Oswego; 1757 the French took Fort William Henry, and with their Indian allies massacred almost all its garrison after the surrender; 1758 Abercombie was defeated in an attack on Ticonderoga, and Col. Bradstreet captured Fort Frontenac; 1759 Niagara was taken by Gen. Prideaux and Sir William Johnson, and the French abandoned Ticonderoga and Crown Point on the advance of the English, and gave up the struggle for possession of the province.

In the events directly preceding the revolutionary war, the people of N. Y. took a prominent and conspicuous stand. In 1775, May, Ethan Allen's 'Green Mountain Boys, from Vt., captured Ticonderoga and Crown Point; in Oct., Tryon, the last royal gov., was driven to refuge on an English war-vessel; 1776, Feb., a patriot force seized New York; July 9 the provincial congress reassembled at White Plains, and approved the Declaration of Independence; and Aug. 27 following, the Americans were defeated in the battle of Long Island, and soon afterward the British occupied New York. In 1777 Burgoyne marched into the province from Canada; and though a co-operating force was sent him from New York, and several forts on the Hudson and Lake Champlain fell into his possession, he was forced to surrender at Saratoga Oct. 17. The Indians joined the English and greatly harassed the Americans till 1779, when a force under Gen. Sullivan invaded their country and destroyed their villages; but they subsequently laid waste the Schoharie and Mohawk region. Near New York were engagements at Harlem Heights and White Plains, and the Americans surrendered Forts Washington and Lee on the Hudson prior to the march through N. J. The British evacuated New York 1783, Nov. 25.

The first constitution of the state was adopted 1777, Apr. 20; the first gov. under it was Gen. Clinton, who served till 1795; the Articles of Confederation were ratified 1778, Feb.; the Federal Constitution was adopted 1788, July 26; and Albany was made the capital 1797. The state constitution was revised 1801, '21, and '46; considerably amended 1867 and '74; and by a thorough revision (1894) became virtually a new instrument.

During the second war with England (1812–15) the people of N. Y. were engaged in some of the most important battles on land and sea, and several notable conflicts occurred on the n. and n.w. frontier. During the civil war the state furnished 455,568 troops to the federal armies, and paid $40,000,000 in bounties to her volunteers. In 1868 came the Tweed 'ring' scandal. John T. Hoffman of New York was elected governor, largely due, it was claimed at the time, by flagitious debauchery of the ballot boxes in New York city by

the Tweed ring which succeeded in carrying the state for the Democratic candidate for President, Horatio Seymour, by 10,000. From this year the vote of the city of New York in state politics was recognized as a powerful factor. During Hoffman's term the Tweed 'ring' attained the height of its power. For audacity and rapacity the methods of the Tweed 'ring' were unequaled, but it was soon brought to grief through the disclosures of the New York *Times*. In the meantime it had succeeded in re-electing its favorite candidate, John T. Hoffman, who at the close of his office retired to private life. As a consequence of the operations of this 'ring,' two supreme court judges, George G. Barnard and Albert Cardozo and one superior court judge, John H. McCunn, were ordered to be impeached. Barnard was convicted and removed from office; Cardozo resigned and dodged his trial; McCunn was removed and shortly after died of a broken heart.

Later came the warfare between the 'Stalwarts' and 'Half-breeds,' because of President Garfield's refusal to recognize Senators Conkling and Platt in the matter of federal appointments in the city and state of New York. The administration of Gov. Hill (1885–92) was marked by the legislation for the preservation of the Adirondack region, the creation of the Niagara Falls reservation and of the state board of arbitration, and the introduction of electricity for capital punishment; that of Gov. Odell (1901–5) by radical reforms in the management of charitable and public institutions and by the adoption of the plans in 1903 for improving and enlarging the Erie canal at a cost of $101,000,000. During the administration of Gov. Higgins (1905–7) important events were the investigations of the insurance companies, and electric lighting and gas companies, and the charges of fraud in the New York city mayoralty elections of 1905, preferred by W. R. Hearst, the independent candidate, against the Democratic party.

Government.— The executive authority is vested by the constitution in a gov., elected for 2 years; a lieut. gov., elected for 2 years; and sec. of state, treas., comptroller, atty.gen., a state engineer and surveyor, commissioner of education, supt. of public instruction, supt. of insurance, supt. of banking dept., supt. of state prisons, supt. of public works. There are also railroad commissioners, canal board, civil-service commissioners, state board of arbitration and mediation, state forest commission, state board of pharmacy, factory inspector, agent for discharged convicts, board of equalization, board of health, commissioners of the land office, of claims, fisheries, quarantine, emigration, labor statistics, lunacy, and state survey, and commissioners of the international Niagara Park. The gov. must be a citizen of the United States, at least 30 years old, and have been for 5 years next preceding his election a resident within the state. He has the veto power,

but a bill may be passed over his veto by a vote of two-thirds of both houses. The lieut.gov. must possess the same qualifications as the gov., preside over the senate, with a casting vote only therein, and assume all the functions of the gov. in case of the impeachment, death, or other disability of that officer. The legislative authority is vested in a general assembly, comprising a senate of 50 members, elected for 2 years, and a house of representatives of 150 members, elected for 1 year, salary of each $1,500 per annum and mileage. The judicial authority is vested in a court of appeals of 7 judges, the chief judge and 6 associate judges, elected by popular vote for 14 years; a supreme court of 76 judges, each one being chosen by popular vote for a term of 14 years. The state is divided into eight judicial districts. Other courts provided for by law are county courts, city courts, surrogate's courts, justice's courts. The county officers are judge, surrogate, sheriff, clerk, treasurer, district attorney, superintendent of the poor, and coroners. The officers of the town are supervisor, clerk, commissioner of highways, assessors, constables.

The successive govs., with their terms of service, are as follows: *Dutch:* Peter Minuit 1624–33; Wouter van Twiller 1633–37; Willem Kieft 1637–47; Petrus Stuyesant 1647–64. *English:* Richard Nicolls 1664–67; Francis Lovelace 1667–73. *Dutch:* Anthony Colve 1673–4. *English:* Edmund Andros 1674–83; Thomas Dongan 1683–88; Edmund Andros 1688–9; Jacob Leisler 1689–91; Henry Sloughter 1691; Richard Ingolsby 1691–2; Benjamin Fletcher 1692–98; Richard, Earl Bellamont, 1698–1701; John Nanfan 1701–2; Lord Cornbury 1702–08; John, Lord Lovelace, 1708–9; Richard Ingolsby 1709–10; Robert Hunter 1710–19; Peter Schuyler 1719–20; William Burnet 1720–28; John Montgomerie 1728–31; Rip van Dam 1731–2; William Crosby 1732–36 (the 9 last, excepting Schuyler and Van Dam, were also govs. of N. J. at the same time); George Clarke 1736–43; George Clinton 1743–53; Sir Danvers Osborne 1753; James De Lancey 1753–55; Sir Charles Hardy 1755–57; James De Lancey 1757–60; Cadwallader Colden 1760–1; Robert Markton 1761; Cadwallader Colden 1761–65; Sir Henry Moore 1765–69; Cadwallader Colden 1769–70; John, Lord Dunmore, 1770–1; William Tryon 1771–77. *Constitutional:* George Clinton 1777–95; John Jay 1795–1801; George Clinton 1801–04; Morgan Lewis 1804–07; Daniel D. Tompkins 1807–17; De Witt Clinton 1817–22; Joseph C. Yates 1822–24; De Witt Clinton 1824–28; Nathaniel Pitcher 1828–9; Martin Van Buren 1829; Enos T. Throop 1829–33; William L. Marcy 1833–38; William H. Seward 1838–42; William C. Bouck 1842–44; Silas Wright, Jr., 1844–46; John Young 1846–49; Hamilton Fish 1849–51; Washington Hun 1851–53; Horatio Seymour 1853–55; Myron H. Clark 1855–57; John A. King 1857–59;

Edwin D. Morgan 1859–63; Horatio Seymour 1863–65; Reuben E. Fenton 1865–69; John T. Hoffman 1869–73; John A. Dix 1873–75; Samuel J. Tilden 1875–77; Lucius Robinson 1877–80; Alonzo B. Cornell 1880–83; Grover Cleveland 1883–85; David B. Hill (act'g) 1885–6; David B. Hill 1886–92; Roswell P. Flower 1892–96; Levi P. Morton 1896–97; Frank S. Black, 1897–99; Theodore Roosevelt 1899–1901; Benjamin B. Odell 1901–05; Frank W. Higgins 1905–07; Charles E. Hughes 1907-10; H. White 1910; John A. Dix 1911.

Politics.— State, congressional, and presidential elections are held on Tuesday after the first Monday in Nov. The qualifications of the electors are: Every male citizen of the age of 21 years, who shall have been a citizen for 90 days and an inhabitant of the state one year next preceding any election, and for the last 4 months a resident of the co., and for the last 30 days a resident of the election district in which he may offer his vote, shall be entitled to vote at such election in the election district of which he shall at the time be a resident, and not elsewhere, for all officers that now are or hereafter may be elective by the people, and upon all questions which may be submitted to the vote of the people. Election betters and bribers, and convicts, are excluded from voting. N. Y. has 39 electoral votes. Her votes for pres. and vice-pres. have been as follows: 1792, George Washington and George Clinton 12; 1796, John Adams and Thomas Pinckney; 1800, Thomas Jefferson and Aaron Burr; 1804, Thomas Jefferson and George Clinton 19; 1808, James Madison 13 and George Clinton 6 for pres., and George Clinton 13, James Madison 3, and James Monroe 3, for vice-pres.; 1812, De Witt Clinton and Jared Ingersoll 29; 1816, James Monroe and Daniel D. Tompkins; 1820, James Monroe and Daniel D. Tompkins; 1824, John Quincy Adams 26, William H. Crawford 5, Andrew Jackson 1, and Henry Clay 4, for pres., and John C. Calhoun 29 and Nathan Sanford 7 for vice-pres.; 1828, Andrew Jackson 20 and John Quincy Adams 16 for pres., and John C. Calhoun 20 and Richard Rush 16 for vice-pres.; 1832, Andrew Jackson and Martin Van Buren 42; 1836, Martin Van Buren and Richard M. Johnson; 1840, William H. Harrison and John Tyler; 1844, James K. Polk and George M. Dallas 36; 1848, Zachary Taylor and Millard Fillmore; 1852, Franklin Pierce and William R. King 35; 1856, John C. Fremont and William L. Dayton; 1860, Abraham Lincoln and Hannibal Hamlin; 1864, Abraham Lincoln and Andrew Johnson 33; 1868, Horatio Seymour and Francis P. Blair, Jr.; 1872, U. S. Grant and Henry Wilson 35; 1876, Samuel J. Tilden and Thomas A. Hendricks; 1880, James A. Garfield and Chester A. Arthur; 1884, Grover Cleveland and Thomas A. Hendricks 36; 1888, Benjamin Harrison and Levi P. Morton 36; 1892, Grover Cleveland and Adlai E. Stevenson 36; 1896, Wm. McKinley and Garret A. Hobart.

36; 1900, Wm. McKinley and Theodore Roosevelt 36; 1904, Theodore Roosevelt and Chas. W. Fairbanks 39; 1908, William H. Taft and James S. Sherman, 39. The state sends 37 representatives to congress and 2 senators.

Counties and Cities.—N. Y. has 61 counties and 42 cities. In 1910 the most populous *counties* were: New York 2,762,522; Kings 1,634,351; Erie, 528,985; Monroe 283,212; Westchester 283,055; Onondaga 200,293; Albany 173,666; Queens 284,041. According to the State census of 1910 the most populous *cities* were: New York 4,766,883; Buffalo 423,715; Rochester 218,-149; Syracuse 137,249; Albany 100,253; Troy 76,813; Utica 74,419; Schenectady 72,826; Binghamton 48,443; and Elmira 37,176.

Population.—(1790) 340,120; (1800) 589,051; (1810) 950.049; (1820) 1,372,111; (1830) 1,918,608; (1840) 2,428.921; (1850) 3.097,394; (1860) 3,880,735; (1870) 4.382,759; (1880) 5,082,871; (1890) 5,994,044; (1900) 7,268,894; (1910) 9,113,279.

NEW YORK, The City of: the commercial and financial metropolis of the U. S., and of the empire state of N. Y. at its southernmost extremity; co-extensive with the cos. of New York, Kings, Queens, and Richmond; borders on the Atlantic ocean, Jamaica and New York bays, the Hudson and East rivers, and Long Island sound; 204 m. n.e. of Washington, 190 m. s.w. of Boston, and 710 m. e. by s. of Chicago.

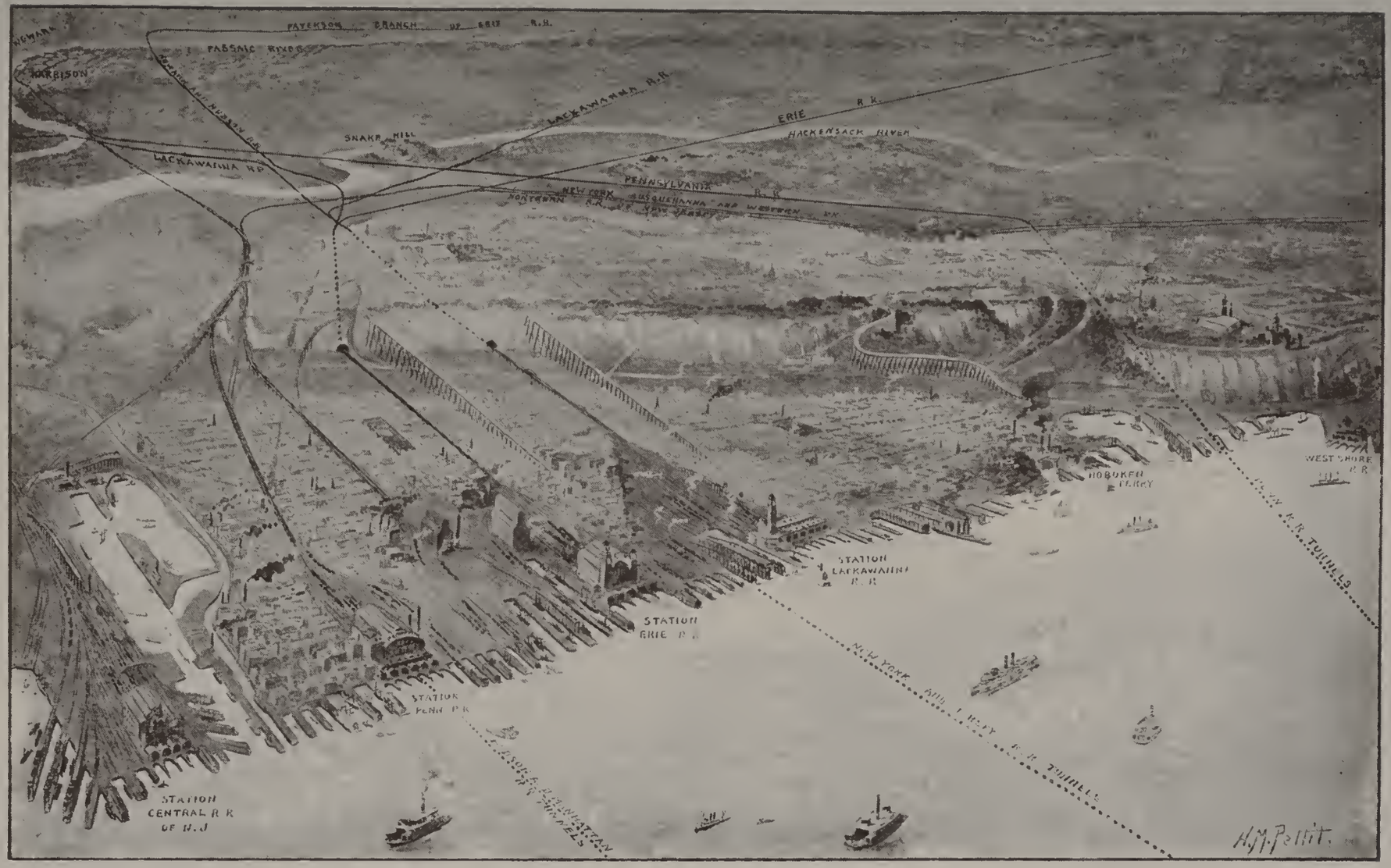
Area and Divisions.—The city comprises a total land and water area of 359.75 sq. m., and since 1898 is divided into the 5 boroughs of Manhattan, Bronx, Brooklyn, Queens, and Richmond. Manhattan borough, area, 22 sq. m.; pop. (1905) 2,112.380; consists of Manhattan, Governor, Bedloe, Ellis, Randall, Ward, and Oyster islands. Manhattan island contains the original city of New York, which, growing northward, from the Battery at its southernmost point, has absorbed numerous villages, including the Bowery, Corlears Hook, Kips Bay, Murray Hill, Greenwich, Chelsea, Hudson, Yorkville, Bloomingdale, Manhattanville, Harlem, Riverside, Carmonville, Fort Washington, and Inwood; these names still distinguish the various localities. Bronx borough, area, 40 sq. m.; pop. (1905) 271,630; formed from that portion of Westchester co. s. of Yonkers city, annexed to New York co. and city in 1874, comprises also City, Travers, Hart, and Riker islands, and includes the former villages of Mott Haven, Port Morris, Casanova, Melrose, Morrisania, Woodstock, Hunts Point, High Bridge, Claremont, Tremont, Mt. Hope, Mt. Eden, Fremont, Fairmont, Unionport, West Farms, University Heights, Fordham, Belmont, Westchester, White Plains, King's Bridge, Spuyten Duyvil, Williamsbridge, Bay Chester, Van Cortlandt, Riverdale, Mosholu, Mt. St. Vincent, Woodlawn, Wakefield, East Chester, and Pelham. Brooklyn borough, area, 66 sq. m.; pop.

(1905) 1,358,686; consisting of the former city of Brooklyn and co-extensive with Kings co.; includes also such well-known localities as Williamsburg, The Heights, Red Hook, Bedford, Newtown, Greenpoint, Bushwick, East New York, Gowanus Bay, Greenwood, Flatbush, Canarsie, Bay Ridge, Parkville, Blythebourne, New Utrecht, Gravesend, Fort Hamilton, Bath Beach, Bensonhurst, Coney Island, Brighton Beach, Manhattan Beach, Sheepshead Bay, and Barren Island. QUEENS BOROUGH, area, 124 sq. m.; pop. (1905) 198,240; co-extensive with Queens co., the western portion of that co. annexed to New York city in 1898, the eastern portion, outside the city limits, now being known as Nassau co., lies between East river on the n.w. and Jamaica bay and the Atlantic ocean on the s.e., and includes within its boundaries, Long Island City, Hunters Point, Corona, Flushing and its bay, North Beach, Berrian, North and South Brothers islands, College Point, Whitestone, Bayside, Little Neck and its bay, Creedmoor, Jamaica, Maspeth, Richmond Hill, Woodhaven, Springland, Far Rockaway, Arverne, Oceanus, and Rockaway Park. RICHMOND BOROUGH, area, 57 sq. m.; pop. (1905) 72,845; co-extensive with Staten Island, also called South New York, includes the populous localities of New Brighton, West New Brighton, Port Richmond, Stapleton, Castleton, Fort Wadsworth, Fort Tompkins, South Beach, Midland Beach, Dongan Hills, New Dorp, Richmond, Linoleumville, Rossville, and Tottenville.

Population.—In 1905, June 1, the total population within the city boundaries, as given by the semi-decennial state census was 4,013,781, an increase in 5 years of 576,579 over the federal census of 1900, 3,437,202, and only 638,646 less than the municipal population of London within the city and county area of 118 sq. m. But the population within and around New York City is over 6,000,000, for n.e. extending to and beyond the boundary line of Connecticut, among suburban populous centres are New Rochelle, Greenwich, Yonkers, Rye, Portchester, Mount Vernon, and Stamford, and w. on the Jersey bank of the Hudson are Jersey City, Hoboken, Bayonne, Elizabeth, Arlington, Rutherford, Hackensack, Englewood, Passaic, the great manufacturing centres of Paterson, Newark, and smaller towns, with a combined population exceeding 2,000,000. All these populous cities and residential suburbs, mostly inhabited by persons whose business interests are in New York City, practically form part of the great metropolis, as does the 'outer ring' of the municipal county of London, defined by the boundary of the metropolitan police district, inclosing in 693 sq. m., several large towns, and giving London and suburbs a total pop. of 6,907,756.

In 1910 the population of Greater New York had increased to 4,766,883.

Harbor.—New York City stands on one of the most commodious and attractive harbors in the world, alive



A bird's-eye view of the Jersey shore opposite New York, showing arrangement of tunnels and connecting railroads. The lower McAdoo tunnel — the Hudson and Manhattan R. R.—runs from the old Pennsylvania station at Jersey City to Cortlandt Street, New York, serving the Central Railroad of New Jersey, the down-town branch of the Pennsylvania and the Erie. The upper McAdoo tunnel — the New York and Jersey R. R.—runs across from about the Lackawanna Station in Hoboken to Morton Street, New York, serving the Lackawanna.

with craft day and night the year round, and consists of upper and lower bays, giving access to the navigable Hudson or North river, and the East and Harlem rivers surrounding Manhattan Island; it also communicates through Hell Gate with Long Island Sound, and through the Kill von Kull with Newark bay. The lower and upper bays are connected by a strait less than one m. wide, formed by the shores of Long Island and Staten Island, and known as the Narrows. This entrance to the upper bay is defended by two forts—Hamilton, on the Long Island shore, 47 ft. above low water; and the united works on the Wadsworth reservation on Staten Island, which comprise Fort Wadsworth proper, a triple casemate of granite, Fort Tompkins, on the crest of the hill, Battery Hudson and a long line of water-batteries. Approach to the city from Long Island Sound is defended by Fort Schuyler, on Throgg's Neck, at the junction of the East river with the Sound, by the supporting works opposite, at Willet's Point, and by masked batteries at various points along the Sound. Within the upper bay, 1,000 yards from the extreme s. point of the city, or the Battery, and 6 m. n. by e. of the Narrows, is Governor's Island, on which are Fort Columbus, a stone work at the centre of the island, Castle William, a stone work with three tiers of casemates, finished 1811, on the n.w. point, and the South Battery, a triangular work on the s. A part of the island is occupied by the ordnance dept. as the New York arsenal, and another part as the headquarters of the U. S. milit. dept. of the Atlantic. The lower bay and its approaches are defended by the powerful system of modern fortifications at Sandy Hook. The sites of the old Forts Washington (175th st.), George (1 m. from the n. end of Manhattan Island, on the e. side), and Lee (on the Palisades of the Hudson) are now occupied by residences and pleasure-grounds. Bedloe's, now known as Liberty, Island contains Bartholdi's colossal statue of Liberty Enlightening the World (see LIBERTY, STATUE OF); and Ellis Island, used for many years by the federal govt., as a naval powder-magazine, is now occupied by the fine building of the immigrant depot under the jurisdiction of the U. S. treas. dept.

Bridges.—Numerous bridges span the East and Harlem rivers. The most celebrated of these is the Brooklyn wire-suspension bridge across the East river, opened for traffic in 1883, and connecting Brooklyn at Sands street with Manhattan at Park Row, opposite City Hall park. The total weight of the suspended structure, river span, is 6,740 tons; maximum weight of cars, vehicles, and pedestrians that can be accommodated on the bridge at one time is 1,380 tons; the ordinary pull on the cables from these combined weights is 11,700 tons; and the ultimate strength of the cables is 49,200 tons. The bridge is 85 ft. wide and has 5 aves.—the central, an elevated promenade, 15½ ft. wide, for pedestrians; two on the sides of this, 16 ft. wide, for railroad tracks;

and two outer ones, nearly 19 ft. wide, for vehicles, including electric street cars. (For further details, see BRIDGE.) The next bridge in importance is the New East River or Williamsburg Bridge, opened for traffic in 1903, connecting Delancey street, Manhattan, and Broadway, Brooklyn; it is the largest suspension bridge in the world, having a span of 7,200 ft. as compared with 6,000 ft. for the Brooklyn Bridge, a channel span of 1,600 ft., 5 more than its neighbor; the minimum height at centre above water is 135 ft. for both; the height of the towers above water 335 ft., of Brooklyn Bridge 276 ft., and the respective widths 118 and 85 ft. Other bridges projected across East river are Manhattan Bridge, from Canal street and the Bowery, Manhattan, to connect with Flatbush avenue, Brooklyn; Blackwell's Island Bridge across that island connecting 59th st., Manhattan, with Long Island City; and a bridge from Corlears Hook, Manhattan, to the Navy Yard, Brooklyn. Washington Bridge across the Harlem river connecting 181st st., Manhattan, with Central ave., Bronx, is one of the finest structures of its kind in the country, and another important high-level passage-way is that which carries the Croton aqueduct across the Harlem river and valley at 175th st., generally designated as High Bridge. It is 1,460 ft. long, and is supported by 13 arches resting on granite piers, the crown of the highest arch being 116 ft. above the river. The water is conducted over in large cast-iron pipes, laid in brick masonry, and the bridge furnishes a grand and popular promenade for pedestrians. The other bridges are the Second ave., railroad; Third ave., general Traffic; Fourth ave., railroad; Madison ave., extending to 138th st.; Central (formerly Macomb's Dam) Bridge, of iron; railroad bridge between Central and High bridges; footbridge at Fordham Heights; Farmer's Bridge, 1 m. above High Bridge; King's Bridge, at junction of Harlem river and Spuyten Duyvil creek; and drawbridge at the junction of the Hudson river and Spuyten Duyvil creek.

Railroads, Ferries, Tunnels.—Of the numerous railroads virtually terminating in New York, but three—the New York Central and Hudson River, the New York, New Haven and Hartford, and the New York and Harlem—had actual starting points in the city prior to 1906; the Long Island roads started from Brooklyn and Long Island City. The Baltimore and Ohio, the Central of New Jersey, the Delaware Lackawanna and Western, the New York Lake Erie and Western, the Pennsylvania, the Ontario and Western, the West Shore and Buffalo, the Lehigh Valley, the New York Susquehanna and Western, and the New Jersey Southern, depots in N. J., are reached from New York by steam-ferries across the Hudson river. Numerous other steam-ferries accommodating passengers, vehicles, and freight, also connect the Long Island, Staten Island, and Jersey shores with Manhattan. The

GIGANTIC TERMINAL STATION FOR THE HUDSON RIVER TUNNEL AT CORTLANDT ST., NEW YORK.

The trains from Jersey City will enter Manhattan by the tube shown in the foreground. The single track will diverge into five tracks, which will swing to the left and enter a six-platform station below the large building shown in the background. This building, 22 stories high, will be nearly three times larger than any existing office building, and will house 20,000 people. Trains return to Jersey City by the tunnel shown at the left of building.

Pennsylvania Railways Co. have projected a double-tunnel from Weehawken, N. J. under the Hudson river to 32d st. Manhattan; where, as planned, it connects with a four-track subway across Manhattan, a sub-grade trainyard between 10th and 7th aves., and the largest terminal station in the world at 7th and 8th aves. between 31st and 33d sts.; thence, a twin-tube tunnel under the East river at 33d st. to Long Island City connecting with the Long Island R. R., virtually a branch of the Pennsylvania Co. and by means of a bridge across Hell Gate, reaches into New England; the whole metropolitan Penna. system also connect with the largest freight yard in the world at Greenville, N. J., with the Bush terminal plant in South Brooklyn, and with a 50,000-Kilowatt electric power house at Long Island City. As designed at a cost of $120,000,000, electrifying the railroads throughout the island the magnificent new terminal on 7th and 8th aves. between 31st and 33d sts., Manhattan, covers an area of 800 by 512 ft., or ten acres. The architectual Style is Roman. The building has a depth of 40 ft. below the street-level, and a height of 80 feet above, with a central tower rising to 150 ft.; the colonnade extending around the main building is over half a mile in extent. Impressive entrances, and a gorgeous interior including the great concourse, elegant waiting rooms, restaurant, etc., add to a structure, the classic dignity of which, with its long, low line of marble columns and pale pink granite outer walls, is in marked contrast to the tower-like office buildings of the city. Other tunnels projected under the Hudson river are those of the New York and Jersey R. R. Co. connecting Hoboken, N. J. with Manhattan at Morton, Greenwich and Christopher sts., and of the Hudson and Manhattan R. R. Co., connecting Jersey City, with Manhattan at Cortland and Church sts., where as designed, lofty 20-story terminal buildings have arcades on Dey st., towers at the corners which face the river, and standing on the west side of Church st., cover the two blocks from Cortlandt to Fulton st. Popularly called the McAdoo tunnels "after the president of both these companies, under whom they were successfully developed, they interfacilitate the direct communications of the Erie, Lackawanna, and Pennsylvania railroads, with Manhattan. Besides the Pennsylvania tunnel under the East river already mentioned, the Belmont Tunnel is projected from 42d st. Manhattan to Long Island City, to intercommunicate with other systems and promote the transit work of the New York Central Railroad Co. Replacing the Grand Central Station built in 1871, the new Grand Central Station as designed at a cost of $25,000,000, has a frontage of 300 ft. on 42d st., and 625 ft. at the upper or 45th st. and; the west facade, on Vanderbilt ave. extends 680 ft., and the east on Lexington ave. 400 ft. The architectural design is classical Roman and the main feature of the

42d st. front comprises three great arches 60 ft. high, flanked by massive columns, and surmounted by a mammoth clock; a vast concourse, magnificent waiting rooms, elegant stairways, restaurant, hanging gardens, etc. are additional features, with extensive terminal yards covering a vast acreage; electric power stations are installed at Port Morris in the Bronx, and at Yonkers, each of 50,000 Kilowatt capacity, for the electrification estimated at a cost of $20,000,000, of the southern portion of the Grand Central lines.

Another tunnel completed 1905, Dec. 1, beneath the East river from South Ferry, Manhattan to Joralemon st., Brooklyn, accommodates the extension of the New York Rapid Transit Subway to Atlantic ave., Brooklyn, where it communicates with the depot of the Long Island R. R. From South Ferry, Manhattan, the electrically equipped subway extends northward to Fort George, and in the open across Spuyten Duyvil to Marble Hill, near Kingsbridge; at 104th st. (change at 96th st. station) the Lenox ave. branch diverges to 141st st., thence under the Harlem river to Bronx Park. The total cost of building the Manhattan sections opened Oct. 27, 1904 was $40,000,000; of the Brooklyn extension $8,000,000. The Interborough Rapid Transit Co. controls the subway, and in 1902, acquired for 999 years a lease of the Manhattan Railroad Co.'s system and the elevated railroads; these extend from South Ferry (e.), through Second and Third avenues., to the Harlem river at 129th st., and beyond past Tremont to Bronx Park, and (w.) through Sixth, Eighth and Ninth aves. to the Polo Ground, Harlem river and Speedway at 155th st., there are 7 elevated lines traverning that and adjacent boroughs in all directions, nearly 100 street railway lines with a few exceptions all equipped with electricity, ramify through New York city and aggregate a total of over 1,230 miles of track, constructed and equipped at an outlay of $250,000,000. Horse cars began to run on Broadway, Manhattan, 1885 June 22; cable cars 1893, July 29; electric cars 1901, May 26. The fare on subway, elevated, and street level railroads, is 5 cents for the entire distance, or any part of each route.

Canal, Docks, Piers, Steamships, etc.—Since 1895, June 17, the Harlem ship canal, 1 m. long, 400 ft. wide, and 15 ft. deep, connects the Hudson and Harlem rivers; it cost $2,700,000. Numerous docks, wharves, recreation and other piers, line the e., s., & w. shores of Manhattan, the shores of Brooklyn, and Richmond boroughs, many of which are leased by the city to railroad, steamship, steamboat, and steam-ferry companies. The principal steamship lines between the city proper and various European ports are the American, Cunard, White Star, Anchor, National, North German Lloyd, and the Compagnie Générale Transatlantique, nearly all of which, add vessels of remarkable magnificence and speed to their fleets each year. Some of these new 'ocean

NEW YORK'S NEW TRANSPORTATION SYSTEM.

Sectional view looking north at the junction of Sixth Avenue and 32d Street, showing five superimposed railway systems: The Pennsylvania, Rapid Transit Subway, Hudson Companies, Street Surface, and Elevated Railways.

greyhounds' have reduced the time of passage between the continents to just over 5 days. Notable are the *Cedric, Celtic, Oceanic* and *Adriatic* of the White Star line, the turbine liners *Carmanica, Caronia*, and *Mauretania* of the Cunard Co., and the *Provence* of the French lines. The docks on the Jersey shore of the Hudson also virtually form part of New York harbor, and there are found the splendid steamers of the Hamburg-American line the *Amerika, Kaiserin Auguste Victoria*, etc. There are also direct steamship lines to S. and Central America, W. Indies, Windward Islands, Cuba, Mexico, and numerous domestic and foreign ports. Steamboats ply regularly up the Hudson river, Long Island Sound, and to N. J. coast landings, those on the New York and Albany, the Providence, and the Fall River lines being particularly large and swift, and sumptuously finished and furnished. During the summer excursion season, the city's steam flotilla is more than doubled by boats that make rapid trips to Long Branch, Coney Island, Rockaway Beach, and other near-by popular coast resorts.

Streets and Parks.—The lower parts of the city in Manhattan, and along the shore front of Brooklyn, Long Island City, etc., are laid out very irregularly, with many short and narrow streets. At Houston st., Manhattan, there is a beginning of regularity, and from 14th st. the modern system of straight aves. and sts. intersecting at right angles is carried out to the extreme n. limit. The avenues, which bear both names and numerals, average 100 ft. in width, with four 150 ft. wide each; and the numerical sts. average 60 ft. in width, with twenty 100 ft. wide each. Broadway extends from Battery Place n.w. 6 m., and joins the Boulevard at 78th st., after crossing five aves. First and Second aves. extend from E. Houston st. n. to the Harlem. Third and Fourth avenues are continuations of the Bowery n. to the Harlem and on into the Bronx. Fifth ave. continues West Broadway and South Fifth ave. to the Harlem at 144th st., passing through Washington Park, along the w. side of Madison sq., the e. side of Central park and through Mt. Morris sq.; Sixth ave. n. from Carmine st.; Seventh ave. n. from Greenwich ave.; Eighth ave. n. from Hudson st.; Ninth ave. n. from Gansevoort st.; Tenth ave. n. from West st.; Eleventh ave. n. from W. 14th st.; Twelfth ave. n. from W. 30th to W. 57th streets; and Thirteenth ave. n. from W. 11th to W. 25th streets. Of the four lettered avenues (A, B, C, D) on the e. side, Ave. A is longest, extending from E. Houston st. n. to 93d st. and East river. The parks and squares, all of which, excepting Gramercy sq. (private), are under control of the dept. of public parks, comprise Abingdon sq., Audubon Park, Battery Park, Beach st. sq., Boston Road (164th st.), Boston Road and 169th st., Bowling Green, Bryant Park, Canal st. sq., Cedar Park, Central Park, Christopher st. sq., City Hall Park, Colonial Park, Cooper Union Park,

Duane st. sq., East River Park, Five Points Park, Fulton ave. and 167th st., Fulton ave. and 170th st., Grand st. sq., High Bridge Park, and the Harlem speedway, Jackson sq., Jeannette Park, Madison sq., Manhattan sq., Morningside Park, Mt. Morris sq., Riverside Park, St. Nicholas Park, Stuyvesant sq., Tompkins sq., Union sq., and Washington sq. Riverside Park has been extended to connect with Fort Washington Park and the Harlem Speedway n. of the Fort George Bluff, and the fine Manhattan viaduct spans the valley between Grant's Tomb and the heights beyond. In the Bronx are: Van Cortlandt Park, near the Yonkers line, 1,069 acres; Bronx Park, between West Farms and Williams Bridge, 653 acres containing zoological and botanical gardens, ranking among the best in the world; Crotona Park, s. of n. Third and Boston avenues, 135 acres; St. Mary's Park, Morrisania, 25 acres; Claremont Park, ¾ m. e. of High Bridge, 38 acres; and Pelham Bay Park, Long Island Sound shore-line (9m.), including Hunter's Island, 1,700 acres. Broad boulevards, designated as parkways, connect Van Cortlandt and Bronx parks. Bronx and Pelham Bay parks, and Crotona and Bronx parks.

Central Park.—Central Park is largest, most beautiful, and best-known park in the city, and one of the most attractive pleasure-grounds in the world. The establishment of a great public park in the city was suggested 1850 by Andrew J. Downing, landscape-gardener; the legislature passed an act authorizing the city to take possession of the site of the present park 1853; five commissioners were appointed by the supreme court of N. Y. to take the land formally the same year; their report was confirmed by the court after they had labored three years; and the common council passed an ordinance for the payment of $5,160,369 for the land, $1,657,590 of which it assessed against property adjoining that would be benefited by the improvement. In 1858, plans prepared by Frederick Law Olmsted and Calvert Vaux were accepted, and soon afterward the work of laying out the park began. The land originally comprised 776 acres; but it has been increased since by the addition of 68 acres and Manhattan sq. (18 acres), so that it now contains 862 acres. It is bounded n. by 110th st., e. by Fifth ave., s. by 59th st., w. by Eighth ave.; is a perfect parallelogram in shape, separated into the upper and the lower divisions by two Croton reservoirs; and is a little more than 2½ m. long and a little more than ½ m. wide. The reservoirs cover nearly 150 acres, and the wooded ground 400 acres; the carriage-ways aggregate 9 m. in length, the bridle-paths 5¾ m., walks and footpaths 29½ m.; all the park, excepting a part of the n. end, is surrounded by a stone wall; and there are 19 entrances, provided with wood gates, but designed ultimately to have ornamental arches and gates, and symbolical statuary. The following designation of the entrances indicates the character

METROPOLITAN MUSEUM OF ART.

of the proposed symbolism: Scholars' Gate, Fifth ave., 59th st.; Artists', Sixth ave., 59th st.; Artisans', Seventh ave., 59th st.; Merchants', Eighth ave., 59th st.; Women's, Eighth ave., 72d st.; Hunters', Eighth ave., 79th st.; Mariners', Eighth ave., 85th st.; Gate of All Saints, Eighth ave., 96th st.; Boys', Eighth ave., 100th st.; Strangers', Eighth ave., 110th st.; Students', Fifth ave., 67th st.; Children's, Fifth ave., 72d st.; Miners', Fifth ave., 79th st.; Engineers', Fifth ave., 90th st.; Woodman's Fifth ave., 96th st.; Girls', Fifth ave., 102d st.; Pioneers', Fifth ave., 110th st.; Farmers', Sixth ave., 110th st.; Warriors', Seventh ave., 110th st. The park contains numerous works of art, the most important of which are: the Terrace and its grand carvings; Cleopatra's Needle, or the Obelisk, presented to the city by the khedive of Egypt 1877; Bethesda Fountain, in the Esplanade, near the shore of the lake, bronze, designed and executed by Emma Stebbins 1864–5; Marble Arch; and the statutes and busts that line the Mall, and those elsewhere located. The latter include: Fitz-Greene Halleck, bronze statue by Wilson MacDonald, erected 1877; Alexander Hamilton, granite statue, Charles Conradts, 1880; Alexander von Humboldt, bronze bust, Gustave Blaeser, 1869; Giuseppe Mazzini, bronze bust, Turini, 1878; Thomas Moore, bust 1880; Samuel F. B. Morse, life-size bronze statue, Pickett, 1871; the poet Schiller, bronze bust, Richter, 1859; Sir Walter Scott, bronze statue, copy of Steele's Edinburgh statue, 1872; Shakespeare, bronze statue, J. Q. A. Ward, 1872; Daniel Webster, heroic bronze statue, Thomas Ball; Ludwig Beethoven, bronze bust, 1884; Simon Bolivar, equestrian statue, De la Cora, 1884; Robert Burns, bronze statue, Steele, 1880; Columbus (2), McGown's Pass, and the Mall, bronze statue, 1894; Richard M. Hunt, pp. Lenox Library; Shepard Fountain; Gen. T. Sherman, equestrian, on Plaza; Thornwalsden, bronze, 1894; and the ideals—*Commeree*, bronze, 1865; *Eagles and Goat*, bronze, 1863; *Faleoner*, bronze group, George Simonds, 1872; *Indian Hunter*, life-size bronze, J. Q. A. Ward; *The Pilgrim*, heroic-size bronze statue, J. Q. A. Ward; *The Still Hunt*, animal group, Kemeys; *Tigress and Young*, bronze group, Caine, 1867; and the *Seventh Regiment Memorial*, uniformed bronze figure, J. Q. A. Ward, 1872. The park contains 48 bridges, archways, and tunnels, of brick and granite, solid rock, stone and brick, stone and iron, stone and wood, and wood. The buildings number at present 30, the most important of which are: the Metropolitan Museum of Art, the Museum of Natural History; described further on, and the old Arsenal, now containing the meteorological observatory and a part of the menagerie. The zoological section is especially attractive and other points of interest are the Ramble, Carrousel for children, Belvedere, Casino, Ball-ground, Green, or Common, with its flock of fine sheep, the Lake, the Pond, Harlem Meer, Cave, and Lily Pond

Prospect Park, Ocean Parkway, Bay Ridge Parkway, Greenwood Cemetry, etc., in Brooklyn and distinctive features in Queens and Richmond, will be found by reference to the description under the respective titles of those boroughs.

Cemeteries.—Besides Greenwood Cemetery just mentioned, there are more than 40 other metropolitan cemeteries, including a crematory in the form of a Grecian temple, established at Fresh Pond, L. I. in 1885 and in which 2,500 bodies have been incinerated, and the burial grounds at Calvary, Cypress Hills, Kensico, Evergreen, Lutheran, Maple Grove, Marble, Mount Hope, Mount Olivet, Rockland, Rosedale, Trinity, Union, Washington and Woodlawn. The borough of Queens contains more cemeteries than any other section. The annual death rate of the city averages 18.15 per 1,000.

Monuments and Statues.—In Manhattan, the following monuments and statues, excluding those in Central Park, are conspicuous in the public parks and squares, and in Trinity and St. Paul's church-yards: William E. Dodge, bronze statue, at Broadway, Sixth ave., and 36th st., erected by New York merchants 1885; Admiral Farragut, symbolic statue by Augustus Saint-Gaudens, at n.w. corner of Madison Sq. Park; Benjamin Franklin, heroic-size bronze statue, Printing-house sq., 1872; Giuseppe Garibaldi, heroic-size bronze statue by Turini, Washington sq., 1888; Horace Greeley, bronze statue, seated, by J. Q. A. Ward, in front of N. Y. *Tribune* office, 1890; Washington Irving, colossal bronze bust by Beer, Bryant Park, 1866; Gen. Lafayette, bronze statue by Bartholdi, Union sq., opposite Broadway, 1876; Abraham Lincoln, heroic-size bronze statue by H. K. Brown, s.w. corner of Union sq., 1868; William H. Seward, bronze statue by Randolph Rogers, s.w. corner of Madison sq., 1876; George Washington, heroic equestrian statue by H. K. Brown, Union sq., opposite the Lincoln statue: a second of Washington, on the steps of the U. S. Sub-Treas. building, the site of Federal Hall, where he took the oath as first pres., by J. Q. A. Ward, 1883: a third of Washington, copy of the Houdon statue, in Riverside Park; Maj.Gen. Worth, granite obelisk, at Broadway, 5th ave., and 25th st., 1857; 'Martyrs' Monument,' magnificent red-sandstone memorial to the American patriots who died in British prisons in N. Y. during the revolutionary war, n.e. corner Trinity churchyard: monument to Capt. Lawrence of the *Chesapeake*, at left of entrance to Trinity Church; and monuments to Thomas Addis Emmet, below the Broadway end of St. Paul's Church, and to Maj.Gen. Montgomery, built in the exterior of the wall at the Broadway end of St. Paul's Church. The lofty column surmounted by a colossal figure of Columbus with allegorical figures at the pedestal and base of the column, at 8th ave. and the 59th st. entrance to Central Park, was unveiled Oct. 12, 1894. Grant's Tomb, a superb mausoleum on Riverside Drive and 123d

st., is 160 ft. high and was dedicated 1897, Apr. 17. Among other Manhattan statues are ex-President Arthur, Madison sq., 1899; Orestes Brownson, Sherman sq. park; Roscoe Conkling, Madison sq., 1893; Abraham DePeyster, Bowling Green, 1895; Horace Greeley, Greeley sq. B'way and 32d st., 1894; Nathan Hale, City Hall Park, 1895; Gen. W. S. Hancock, Hancock sq. & St. Nicholas ave., at 123d st., 1893; Heine Fountain, 161st st. & Mott ave., 1899; U. L. Holley, Washington sq. 1890; H. B. Hyde, Equitable Building, 1901; J. M. Sims, Bryant Park, 1894; Soldiers and Sailors Monument, Riverside Drive, (1902); Verdi, Sherman sq. 72d st. & B'way, 1906; the imposing Washington marble arch, cost $128,000 Washington sq. 1892; and the Washington-Lafayette group, 114th st. and Morningside Park, 1899.

Buildings.—In recent years, N. Y. C., has added greatly to the number of its massive and imposing buildings, whether for public uses, commercial, financial, or other business purposes, benevolence, or private residence. The new buildings in the lower part of the city are massive structures, many from 10 to 20 and even 30 stories high, designed mainly for offices; the principal ones in the vicinity of Central Park are equally massive, nearly as high, and designed for flat or apartment residence. The most notable increase is the number of flat, apartment, and other dwelling houses, building in all the different boroughs owing to the improved means of transportation. The U. S. govt. buildings are the Sub-Treasury, the magnificent Custom House, completed 1906 at a cost of $10,000,000, on the site of Fort Amsterdam facing Bowling Green, the Broadway Post Office and U. S. Court Building, the beautiful Appellate court-house at 25th st. and Madison ave., the Army Building, Ellis Island Immigration Depot, and Barge office. The chief State building is the turreted greystone State Arsenal on Seventh ave. and 35th st. The chief county buildings are the Court-house in City Hall Park, and the splendid Hall of Records opposite at Chambers and Center streets, completed 1906. The principal city buildings are the City Hall (with a notable collection of portraits of govs., mayors, and milit. and naval officers in the Governor's Room), the improving Tombs prison completed 1906, and courts, on Center st., the armories of the N. G. S. N. Y., the police and district courts, police headquarters and stations, the extensive markets, buildings of the fire dept., the numerous educational institutions, public and high school buildings, notably Normal College at Park ave., 68th and 69th sts., and the fine new buildings of the College of the City of New York (q.v.) on St. Nicholas Heights. Amsterdam ave., public libraries and museums, elsewhere described, and the charitable and reformatory institutions under control of the dept. of public charities and correction. The latter include the penitentiary, almshouse, lunatic asylum for females,

workhouse, blind asylum, charity hospital, hospital for incurables, and convalescent hospital, on Blackwell's Island; the idiot asylum, nursery, children's and infants' hospital, schools and other institutions for destitute children, on Randall's Island; and the insane asylum for males and the homeopathic hospital, on Ward's Island. Randall's Island also contains the house of refuge, under control of the Soc. for Reformation of Juvenile Delinquents; and Ward's Island, the state emigrant hospital, lunatic asylum, house of refuge, and children's nursery, under control of the N. Y. Commissioners of Emigration, and a home for invalid soldiers of the civil war who belonged to city regiments. All these buildings are large, were erected for their respective uses, and were built of brick or of stone quarried on Blackwell's Island, a great part of the labor being done by convicts. The leading commercial exchange, have more or less imposing buildings and comprise the new Stock Exchange opened 1903, the Produce, Cotton, Maritime, Metal, Consolidated Petroleum, Real-Estate, Building Material, Coal and Iron, and Coffee exchanges. Palatial newspaper, insurance, banking, commercial, and other buildings include those of the New York Herald, Herald sq. and 32d st., the Times building, Times sq. (formerly Longacre) and 42d st., the Tribune and World buildings, Park row, the Manhattan, Equitable, Home, and New York Life Insurance buildings, the Metropolitan Insurance building, Madison sq., St. Paul's, Trinity, Park Row Syndicate, American Surety, Western Union Telegraph Co., associated banks Clearing House, Chamber of Commerce, Gillender, the Fuller or 'Flatiron,' at 23d st. and Madison sq., and other office buildings. Noticeable also are the great department stores on Broadway, Fifth and Sixth aves., 14th, 23d, and 125th sts.; the many first-class hotels led by the Waldorf-Astoria, St. Regis, etc.; the first-class apartment hotels and houses, with rents ranging from $1,200 to $10,000 per annum, theatres, opera houses, and halls, including the Metropolitan Opera House, Madison Square Garden, Carnegie Hall, and the mammoth Hippodrome, numerous establishments for Russian, Turkish, and medicated baths, and for free public baths, open from June till Oct.; hospitals of all kinds: dispensaries not connected with hospitals, and the many branch offices and substations of the post-office, and of telegraph, telephone, and express companies. Other features of high-class life are the club buildings, the chief of which include the Aldine, American Jockey, Arion, Authors', Caledonian, Calumet, Catholic, Century, Cóney Island Jockey, Delta Kappa Epsilon, Down-town, Electric, Fellowcraft, Freundschaft, German, Grolier, Harlem, Harmonie, Holland, Knickerbocker, Lambs', Lawyers', Liederkranz, Lotus, Manhattan, Manhattan Athletic, Merchants', Metropolitan, New York Athletic, New York, New York Press, New York Yacht, Nineteenth Century, Progress,

Psi Upsilon, St. Nicholas, Union, Union League, and University Clubs.

Churches.—St. Patrick's Cathedral (Rom. Cath.), on Fifth ave., between 50th and 51st sts., is considered one of the most imposing church edifices in the United States. It was projected by Abp. Hughes 1850, planned by James Renwick, begun 1858, and dedicated 1879. It is of white marble, in the decorated or geometric style common to Europe in the 13th c., is in the form of a Latin cross, has two towers and spires, each 330 ft. high, and when completed in all its parts will have cost $2,500,000, exclusive of gifts of memorial windows, alters, paintings, and statuary. The Prot. Episc. Church is building on the dominating site of Morningside Heights, at 110th st., the cathedral of St. John the Divine, which, with the crypt and choir almost completed (1906), promises to be the grandest and costliest ecclesiastical structure in the United States. An association of the church authorities was incorporated to undertake the work 1873; but little advance was made till 1889, when four designs were selected from which to choose the final one. The proposed cathedral is to occupy four times the space of St. Patrick's Cathedral, and its cost has been placed at $6,000,000. A church edifice which has long been a centre of public attraction and interest is Trinity Church, on Broadway, at the head of Wall st. The large and valuable tract of land belonging to the corporation of Trinity Church was included in grants by the English govt. 1697 and the English colonial authorities 1705 (see JANS, ANNEKE). The first church building was erected 1697. This was rebuilt 1737, and destroyed by fire 1776. Another building was completed 1780, and was occupied till 1839, when it was torn down as unsafe, and the present building was finished 1846. It is of brown sandstone, in Gothic style, has a steeple, 284 ft. high, with three clock faces and a full chime of bells, contains a magnificent altar and reredos erected to the memory of William B. Astor by his sons, and massive sympolic bronze doors, a gift of William Waldorf Astor, as a memorial to his father, John Jacob Astor (3d). The corporation of Trinity Church has also erected in the city a number of other church edifices, though officially designating them as chapels. Of these, the best known is St. Paul's, on Broadway, between Vesey and Fulton streets, begun 1764, completed 1766, facing toward the Hudson river, and, like Trinity, in a burying-ground containing the remains of many noted people. It is the oldest church building in the city, and contains, on opposite sides, a large, square 'governor's pew' and a 'president's pew.' The latter was occupied by George Washington after being inaugurated pres.; and by Pres. Harrison on the occasion of the centennial observance of Washington's inauguration, 1889, Apr. 30. The other chapels of Trinity Church are St. John's, Varick st., erected 1803–07; Trinity, 25th st.,

w. of Broadway, 1851–56; St. Chrysostom's, Seventh ave. and 39th st., 1869; St. Augustine's, on Houston st., completed 1877; St. Cornelius's, on Governor's Island; St. Luke's, 481 Hudson st., and St. Agnes', 92d st., near Columbus ave. Trinity Church also maintains many industrial and parochial schools, hospital, mission-house, dispensary, kindergarten, relief bureau, seaside home for women and children, training-school for young girls in household service, and other benevolent institutions. Grace Church, on Broadway and 10th st., with its cluster of handsome white marble buildings, belongs to the second richest Prot. Episc. parish in New York, and was the special object of the large-hearted benefactions of Catherine Lorillard Wolfe. It was the church of the late bp. of New York, Henry C. Potter, D.D., LL.D. Other notable church edifices are those of the Collegiate Reformed (Dutch) Church, one of the oldest Prot. organizations on the continent, and one of the wealthiest corporations in the city. The corporation was chartered by William III. 1696, and built the 'Middle Dutch Church' on Nassau st. 1721. This afterward became the site of the post-office, which in turn gave way to a massive business structure. The corporation has churches on Fifth ave. and 29th st., and Fifth ave. and 48th st., and maintains several chapels and missions. The Jewish synagogues on Fifth ave. and Central Park, the Presbyterian churches at Fifth ave. and 12th st., and at Madison square (opened 1906), and the churches of many other denominations are represented by fine specimens of ecclesiastical architecture. The church property of Manhattan is valued at over $96,000,000, and of the whole city of New York, with over 1,400 churches, at $186,000,000.

Universities, Colleges, Schools, etc.—These include: Columbia Univ. (founded 1754, non-sect.); Univ. of the City of New York (1831, non-sect.); College of the City of New York (1849, non-sect.) (qq.v.); Normal College (1869, non-sect.); College of St. Francis Xavier (1847, R. C.); St. John's College (1841, R. C.); Manhattan College (1853, R. C.); Barnard College for Women (1889, non-sect.), and Teacher's College (1888, non-sect.), with which is incorporated the Horace Mann School. There are numerous public high schools, private academies, seminaries, and other secondary schools, denominational and undenominational, and manual training schools. The theological institutions include: the General Theological Seminary of the Protestant Episcopal Church, Union Theological Seminary (Presb.), and Jewish Theological Seminary: the law schools: Columbia Univ. School of Law, Law School of the Univ. of the City of New York, and New York Law School: the medical schools: Bellevue Hospital Medical College, College of Physicians and Surgeons in the City of New York, Homeopathic Medical College, Electric Medical College, and Woman's Medical College of the New York Infirmary for Women and Children. There are also a College of Dentistry and

Dental School, a College of Pharmacy; schools for training nurses, all connected with hospitals of the city; commercial and business colleges, and schools for defectives and delinquents, including: the Institution for the Improved Instruction of Deaf-mutes; N. Y. Institution for the Instruction of the Deaf and Dumb; Articulation Class, Wright-Humason School; N. Y. Institution for the Blind; School for Feeble-minded; N. Y. Juvenile Asylum; Society for the Reformation of Juvenile Delinquents; and the Wetmore Home.

Among art schools are: the National Academy of Design, since 1905 affiliated with Columbia Univ., the National Arts Club, opened 1906 in the historic Tilden mansion, 14 and 15 Gramercy Park, the schools of the Metropolitan Museum of Art, of Cooper Union, Gotham Art Institute, and the Art Students' League. Among schools of music are: the Institute of Musical Art, New York College of Music, the National Conservatory of Music, the Metropolitan College of Music, and the Grand Conservatory of Music.

There are 192 public schools in Manhattan, 39 in the Bronx, 147 in Brooklyn, 84 in Queens, and 34 in Richmond. Manhattan has 5 high schools, Bronx 1, Brooklyn 6, Queens 7, Richmond 1. The total registration in public schools is 555,342; in high schools, 22,045; the annual appropriation for public educational purposes is over $25,126,000.

Libraries, Museums, Periodicals.—The new public library on the site of the old reservoir at 42d st. and Fifth ave., built at a cost of $2,800,000, represents the consolidation in 1895 of the Astor Library in Lafayette place, the Lenox Library in Fifth ave., and the Tilden Library, under the title of New York Public Library, Astor, Lenox, and Tilden foundations. The consolidated library has an invested endowment of $4,500,000, contains nearly one million vols., and quarter of a million pamphlets. In 1901 Mr. Andrew Carnegie presented the city with $5,200,000 for the erection of 65 branch library buildings in various parts of the city. There are also many institutional, private, and special libraries, that of Columbia Univ., with 350,000 vols., the Mercantile Library, 235,000 vols., the New York Historical Society, and the Society, libraries, 100,000 vols. each, besides the Cooper Union, Free Circulating, Museum of Natural History, Law, Medical, City Hall, Equitable Insurance, and other libraries.

Two-thirds of all the paper-bound books and one-third of all the cloth-bound books published in the U. S. issue from New York City, where nearly 900 periodicals are also published; these include 53 daily, 428 monthly, besides semi-weekly, bi-weekly, tri-weekly, weekly, semi-monthly, quarterly, and annual publications.

The principal museums are: The Metropolitan Museum of Art (q.v.), Central Park, near Fifth ave. and opposite 83d st., formerly opened by the pres. of the

United States 1880, Mar. 30, containing a vast amount of precious treasure. The archæological collection of more than 30,000 objects gathered in Cyprus by the late Gen. Di Cesnola, casts of ancient sculpture; Egyptian antiquities; terra-cottas and bronzes; glass, laces, and antique pottery; the Drexel collection of musical instruments; the Assyrian and Babylonian antiquities collected by William Hayes Ward D.D.; the Douglass collection of Egyptian antiquities; and the paintings —are among the most notable collections in the world. The paintings include: Bonheur's *Horse Fair;* Meissonier's *Friedland,* 1807; Detaille's *Defense of Champigny;* Breton's *Religious Procession in Brittany;* Kaulbach's *Crusaders before Jerusalem;* Turner's *Saltash;* Velasquez's *Don Balthazar;* Fortuny's *Spanish Lady;* Crozik's *Columbus;* Tadema's *Reading of Homer;* Rubens's *Return of the Holy Family from Egpyt;* Van Dyck's *St. Martha* and *Miss De Christyn;* De Crayer's *Alexander and Diogenes;* Benjamin Constant's *Justinian and His Counselors;* and specimens of Rembrandt, Constable, Van Leyden, Gainsborough, Sir Joshua Reynolds, Corot, Piloty, Jordaens, Dirk and Frans Hals, the Van Ostades, Singlebach, Munkacsy, Millet, and other masters. The American Museum of Nat. History, in the former Manhattan sq., Eighth—Ninth avenues, 77th—81st streets, was opened by Pres. Hayes 1877, Dec. 22, and is a post-graduate univ. of nat. science, with invaluable collections, and a dept. of public instruction, including a main lecture hall to seat 1,000 persons. Also interesting are the museums at the Lenox Library (with picture gallery), at the Historical Society building, and at Columbia Univ., the Aquarium in the Old Castle Garden building at Battery Park, and the zoological and botanical gardens in the Bronx.

Water Supply, Municipal Service, etc.—The water with which the city is supplied is drawn from the great watershed of the Croton river, in Westchester co. Artificial storage reservoirs were made at the head of the aqueduct, the principal ones being the Croton Lake, Boyd's Corners, and the Middle Branch reservoirs; capacity of all 9,500,000,000 gallons. The aqueduct, of solid masonry, 40½ m. long, crosses Harlem river on the High Bridge, has a retaining reservoir in Central Park, 4 m. below High Bridge, a receiving reservoir a short distance further s., and high service-towers with powerful pumps at High Bridge and at Ninth ave. and 97th and 98th sts. The entire system cost nearly $30,000,000, and the average daily consumption of water was about 95,000,000 gallons. The Croton aqueduct was formally opened, with grand ceremonies and amid great public rejoicing 1842. The subsequent growth of the city necessitated the construction of a second aqueduct. Authority for this was granted by the legislature, 1883; the work of excavating the tunnel, through which all but four sections of the aqueduct extend, was begun 1885, Mar. 7, and completed 1888, July 7; and the water

was first allowed to run into the Central Park reservoir 1890, July 15. The entire aqueduct is 33⅛ m. long, of which 30¾ m. are through a tunnel 18 ft. in diameter, excavated mostly through solid rock; the water is carried under Harlem river by gravity and siphons; the delivering capacity is 310,000,000 gallons daily, and the cost about $22,000,000. The storage system includes the lakes and reservoirs of the first aqueduct, with additional reservoirs made by building the dams known as Sodom, Fog Brook, Taticus, Amawalk, Carmel, and Quaker Bridge dams, providing a total storage of 26,000,000,000 gallons. The Sodom, Carmel, and Quaker Bridge reservoirs were completed 1891–2. Since then the storage system has been greatly extended by the construction at a cost of $5,475,000 of the Jerome Park reservoir with a capacity of 1,500,000,000 gallons; and by the construction at a cost of $4,150,000 of the Croton dam, completed 1904, adding 21 sq. m. to the drainage area and a storage capacity of 32,000,000,000 gallons, making a total capacity for New York of nearly 70,000,000,000 gallons. The greatest monthly consumption so far recorded has been at the rate of 318,000,000 gallons a day. A further extension of the system is the invasion of the Catskill mountains at a cost of $161,000,000 to supply the city with an additional 250,000,000 gallons of water a day.

The three departments of Docks and Ferries, Water Supply, Gas, and Electricity, and Tenements are each under a single commissioner; the latter has three bureaus. There are three commissioners of parks, appointed by the mayor, one having jurisdiction in the boroughs of Manhattan and Richmond, the second in Brooklyn and Queens, the third in the Bronx; and five commissioners of taxes and assessments. The Department of Health consists of a commissioner of health, the commissioner of police, and the health officer of the port; the departments of Correction, Public Charities, Bridges, Street Cleaning, Police, and Fire are each under a single commissioner; and each borough has a commissioner of Public Works. Educational matters are in charge of a board consisting o' 22 members in Manhattan, 14 in Brooklyn, 4 in the Bronx, 4 in Queens, and 2 in Richmond, and of a board of 9 superintendents.

Government.—The chief executive authority of the city is vested in the mayor, elected for four years and eligible for re-election; salary $15,000 per annum. The chief executive officers of the boroughs are their presidents, elected for two years; salaries, Manhattan, Bronx, and Brooklyn, each $7,500 per annum, Queens and Richmond, each $5,000. The legislative authority is vested in a Board of Aldermen consisting of 73 aldermen, term two years, salary $2,000 per annum; the president of the board elected by the city at large, salary $5,000 per annum; and the five borough presidents. All heads of departments and members of commissions, excepting the head of the Department of Finance and the heads

of certain departments which are placed under the jurisdiction of the borough presidents, are appointed by the mayor, who has power to remove for cause any officer appointed by him excepting members of the Board of Education, the Aqueduct Commissioners, trustees of the College of the City of New York, trustees of Bellevue and allied hospitals, and certain judicial officers for whose removal other provision has been made. In the absence or sickness of the mayor the president of the Board of Aldermen becomes acting mayor. The borough presidents have control of all matters relating to the streets, sewers, and public buildings within their boroughs.

The executive authority is directly administered under the mayor by departments, nearly all of which are subdivided into bureaus. The fiscal authority of the city is the Department of Finance, under the direction of a comptroller, elected by the city at large for four years, salary $15,000 per annum, and a chamberlain appointed by the mayor for four years, salary $12,000 per annum. The Law Department is under a corporation counsel appointed by the mayor for four years, salary $15,000 per annum, who appoints as many assistants as he deems necessary.

The judicial authority of the city is vested in a City Court with 10 judges, elected for ten years, salary of each $12,000 per annum; 9 Municipal Courts in Manhattan, 5 in Brooklyn, 3 in Queens, and 2 each in the Bronx and Richmond, with judges elected for ten years, salary of each $8,000 per annum; 9 Magistrates' Courts in Manhattan and the Bronx, 7 in Brooklyn, 6 in Queens, and 2 in Richmond; and a Children's Court (Manhattan).

The cost of the police department according to the budget for 1908 is $14,350,499; fire department $7,483,485; education $26,712,963; street cleaning $6,632,856; interest on debt $24,576,522; and the entire cost of the city government $135,474,403 exclusive of county schedules of more than $5,000,000, and tax deficiencies of $3,000,000. On 1908, Jan. 1, the gross funded debt of the city was $735,015,765, the total amount of sinking funds $197,437,164, leaving a net funded debt of $537,578,601. According to the report of the Tax Commission, rendered 1908, Aug. 22, the assessment on personal property is $435,774,611, and on real estate $6,722,415,789, a total of $7,158,190,400. The real estate assessment was divided among the boroughs as follows: Manhattan $4,584,536,431; Bronx $441,228,718; Brooklyn $1,334,864,835; Queens $296,458,980; Richmond $65,326,825.

Manufactures.—The latest Federal statistics give New York City 39,776 manufacturing establishments employing $921,876,081 capital and 462,763 persons, paying $245,021,881 for wages and $709,109,412 for materials, and having a combined output valued at $1,371,358,468.

Trade and Commerce.—N. Y. constitutes one of U. S. custom districts, and comprises two internal revenue districts. Over one-half of the imports and one-third of the export trade of the U. S. are carried on through this port. The imports of merchandise at the port of New York during the year 1907 aggregated in value $914,918,529; exports, $978,730,861. The movement in gold and silver (1906) was: Total imports, $99,389,034; exports, $56,262,355.

Immigration.—During 1906-7, 1,285,349 immigrants entered the United States, of whom 1,004,756 landed in the port of New York; the majority came from Italy, Russia, Germany, Austria, England, Greece, Ireland, Sweden, and Norway.

Banks.—In 1908 there were reported 41 national banks in New York City and Brooklyn, with combined resources of $1,674,910,020.55; capital stock $114,382,000; surplus $110,472,410; undivided profits $32,574,896.12, and individual deposits $688,877,022.27. In 1908 there were 59 state banks in the greater city, with total resources of $433,514,743; capital of $24,755,000; and total deposits of $375,667,673. In Kings, Queens, and New York counties (official reports do not give the city as a whole separately) in 1908 there were 51 trust companies with total resources of $1,130,131,947; capital of $59,925,000; and deposits of $872,721,698. In Kings, Queens, New York, and Richmond counties in 1908 there were 57 savings banks with total resources of $1,059,451,354.50; deposits of $958,466,628.22; and 1,795,793 open accounts. The clearing-house exchanges during the year ending 1907, Sep. 30, aggregated $95,315,421,237.

History.—Among the archives at the Hague, Holland, is a letter addressed 'to the High and Mighty Lords of the States-General at the Hague,' signed P. Schagen, and dated 'at Amsterdam, Nov. 5, 1626.' It recites that 'there arrived here yesterday the ship called the Acre of Amsterdam, which sailed from the river Mauritius for New Netherland on the 23d of September. Report is brought that our people there are diligent and live peaceably; their wives have also borne them children. They had purchased the Island of Manhattan from the Indians for the sum of 60 guilders [about $24]. It contains 11,000 margins of land.' So far as known, this letter is the only document in existence which shows the manner and the approximate time of the legal acquisition of the site of New York by the Dutch, after the early occupation by virtue of Hendrik Hudson's discovery 1609. The purchase was made by Peter Minuit, who arrived at New Amsterdam 1626, commissioned as director-general, and invested with authority to organize a regular govt. See NEW YORK (state), *History.*

The first legislative assembly met here 1691, Apr. 6; the first Trinity Church edifice was finished 1697; a malignant epidemic broke out 1702; the fifth newspaper in the colonies, the *New York Gazette*, was established 1725; a city library was founded 1729; Zenger's *New*

York Weekly Journal was started 1733; the first attack on the freedom of the press, and the first great libel suit resulting therefrom, occurred 1735; many negro slaves were hanged, burned at the stake, or transported, on the discovery of an alleged slave plot to burn the city and kill the whites, 1741; King's (now Columbia) College was chartered 1754; the Stamp Act Congress met here 1765, and the Sons of Liberty were organized to oppose the act 1766; the Chamber of Commerce, the first institution of its kind in America, was organized 1768; a slight collision between the troops and a mass-meeting of citizens who had resolved not to submit to oppression occurred 1770; a vigilance committee was formed to prevent the landing of tea 1773; a tea-ship was forced to return to England, and the tea-cargo of another ship was thrown overboard, 1774; and the colonial assembly finally adjourned 1775, Apr. 3. When the news of the battle of Lexington (Apr. 19) reached the city, the citizens' committee of safety assumed the direction of public affairs, and the royal gov. fled to a British war-vessel in the harbor. Delegates were elected July 25 to the continental congress; Aug. 22 a man-of-war fired on the city because congress had ordered the removal of all the cannon in the city to the interior; 1776, Jan., a detachment of the American army took possession of the city, and was followed in the spring by the main army; and Sep. 15, after the American defeat on Long Island, the British occupied the city, and remained in possession till 1783, Nov. 25. During this interval there were disastrous fires—1776, Sep. 21, and 1778, Aug. 7—the schools and colleges were closed, and all non-Episcopal churches were transformed into prisons, stables, and riding-schools. The city was the state cap. 1784–97; seat of the federal govt. 1785–90; and scene of Washington's inauguration as first pres. 1789, Apr. 30. The Bank of New York was organized 1785; the corner-stone of the City Hall was laid 1803; the New York Free School was incorporated 1805; steam-navigation on the Hudson river was first accomplished by Robert Fulton (q.v.) 1807; the city was first surveyed and officially laid out 1807; many privateers sailed from the port, and the first steam-ferry to Jersey City was established, 1812; Gen. Lafayette was given the freedom of the city 1824, Aug. 15; gas was introduced 1825; the Erie canal was opened 1825, Oct.; the city was visited by the Asiatic cholera 1832 and 34; a three days' fire destroyed more than 600 buildings, and $20,000,000 in property, 1835, Dec. 16–19; the Croton aqueduct was completed 1842; another conflagration occurred 1845, July 19; a fatal riot occurred in Astor place, between the supporters of the actors Edwin Forrest (q.v.) and William Charles Macready (q.v.), 1849, May; Louis Kossuth (q.v.) was publicly welcomed 1851; the Crystal Palace industrial exhibition was opened 1853, July 14; a grand celebration of the laying of the Atlantic cable was held 1858; and the first Japanese embassy to the United States, and the Prince of Wales, were publicly received 1860.

During the civil war, the city furnished 116,382 men to the Union armies. Opposition to a federal draft for more men for the army, believed to be unjust as discriminating against the city and favoring the rest of the state, led to a terrible riot 1863, July 13–17, in which many buildings were burned and more than 1,000 lives lost. The riot cost the city in indemnities about $1,500,000. The remains of Pres. Lincoln were escorted through the city 1865, Apr.; a riot between the Orangemen and Ribbonmen, Irish associations, caused the loss of 62 lives and was suppressed by the police and militia 1871, July 12; the Tweed ring, that had perpetrated enormous frauds on the city and co. treasuries, was exposed 1871; a large part of Westchester co. was annexed to New York co. 1873; the East River Bridge to Brooklyn was formally opened 1883, May 24; Bartholdi's Statue of Liberty (q.v.) was received 1885, June 19, and dedicated 1886, Oct. 28; the remains of General Grant were escorted to Riverside Park on the Hudson, by an imposing milit., naval, and civic procession, 1885, Aug. 8; the centennial of the inauguration of Pres. Washington was celebrated 1889, Apr. 29, 30, and May 1; 1891, May 5 occurred the dedication of Carnegie Hall; 1892, the burning of the Metropolitan Opera House, and the laying of the foundation stone of the Cathedral of St. John the Divine; 1893, Apr. 26–27 the Columbus commemoration of the Discovery of America; 1894, the investigation of the municipal govt. by the Lexow Legislative Committee; the downfall of Tammany Hall, and the election of the reform mayor, William L. Strong; 1897, the election of Robt. A. Van Wyck, the Tammany candidate, as first mayor of Greater New York; 1902, of Seth Low, pres. of Columbia Univ., as Republican mayor; in 1903 and 1905 of G. B. McClellan, the Tammany candidate, on the last occasion defeating W. R. Hearst, Independent, 2,000 votes only. In 1897, Apr. 27, the body of Gen. Grant was transferred to a spendid mausoleum in Riverside Park, the obsequies forming one of the grandest funeral commemorations in the world's history, the cost of the mausoleum being about $600,000. A new charter consolidating New York, Brooklyn, Queens co., Staten Island and the Bronx as the city of Greater New York went into effect 1898, Jan. 1, and was amended in 1901. In 1899 the Mazet Investigating Committees held their sessions and the same year occurred the grand military and naval displays, the erection of the splendid temporary Dewey arch, ovations, etc. welcoming home Adm. Dewey and the victorious Philippine squadron. In N. Y. harbor, 1900, June, occurred the disastrous fire to the shipping and docks at Hoboken with a calamitous loss of life. In 1902, 15 persons were killed and 36 seriously injured by a railroad collision in the Park ave. tunnel Jan. 8.; on Jan. 27 6 persons were killed and nearly 100 injured by an explosion in the subway at Park ave. and 41st st., which also seriously damaged the surrounding build-

ings; Feb. 22, the 71st Regt. armory at Park ave. and 34th st. was burned, and the Park ave. hotel opposite caught fire whereby 17 persons were killed and 50 injured; 1904, June 15, the excursion steamer *Gen. Slocum* burned in the East river, and over 1,000 women and children perished; in August, the Williamsburg bridge was completed; and Oct. 27 the subway opened to the public; 1905, Feb. 9, 50 persons were injured in a collision on the Third Ave. Elevated R. R; Feb. 11, the Casino theatre was burned; Mar. 7, a strike of 5,000 employees of the subway and elevated railroads occasioned great inconvenience for several days; the same month a committee investigated and advocated severe measures of Police Reform; in Sept., for the first time since its establishment, passenger cars fell from the elevated railroad at 59th st. and 9th ave. killing and injuring several persons; 1906, Nov. 6, W. R. Hearst in the election for governor carried New York city by a plurality of 76,279 votes but was defeated by a state plurality of 57,851 cast for C. E. Hughes.

NEW YORK, COLLEGE OF THE CITY OF: established 1848 as the Free Academy by the city board of education, received state collegiate powers and privileges in 1854, and its present name in 1866. It long occupied a prominent red brick building at the corner of Lexington avenue and Twenty-third street, but in 1906 removed to magnificent new buildings on Washington Heights overlooking St. Nicholas terrace and park and the upper portion of the city between One Hundred and Thirty-eighth and One Hundred and Fortieth streets and Convent and Amsterdam avenues. These buildings, erected at a cost of $4,000,000 on a site purchased for $800,000, are claimed to equal in size and beauty any similar institution in the world. Attendance for at least one year at the public schools of the city was a condition for admission until a statute of 1882 was repealed to throw the college open to all young men of the city of proper age and preparation. Instruction, the use of text-books and apparatus are free. The 5 courses of study extending over 7 years—3 academic or preparatory and 4 collegiate years—lead to the degrees of B.A. or B.S. The M.A. and M.S. degrees are obtained by 2 years of additional study. Besides the usual academic courses of study, classical and scientific, there is a mechanical course with well-equipped workshops, and a 2-years' post-graduate course in civil engineering. The mechanical differs from the scientific in some features of the senior year, and in the requirement of at least 4 hours' work per week in shops and mechanical laboratory, whereas such practice is optional with other students and under advice of the faculty. The presidents of the institution since its foundation have been Horace Webster (1848–69); Gen. Alex. S. Webb (1869–1901); both from West Point; and since 1903, John Huston Finlay from Princeton Univ.

NEW YORK UNIVERSITY.

NEW YORK UNIVERSITY: originated as the UNIVERSITY OF THE CITY OF NEW YORK, in a private meeting of 9 gentlemen 1829, followed by a public meeting 1830, and an act of incorporation 1831; the opening of college work occurred 1832. The univ. now comprises 8 distinct faculties and schools of marticulants, and also has a summer school and a woman's law class, both made up of non-matriculant students who are enrolled without examination. These departments are situated: Univ. college (fd. 1832), school of applied science (1862), and the summer school, at University Heights, Fordham, N. Y. City; the law school (1835), graduate school (1886), school of pedagogy (1890), school of commerce, accounts and finance (1900), and collegiate division (1903) at Univ. Building, Washington square; the medical college (1841) at E. Twenty-sixth street and First avenue, and the veterinary college (1899) at 141 W. Fifty-fourth street. The academic departments formerly occupied the picturesque Gothic stone building on Washington square erected 1832–35, wherein the recording telegraph was invented by Prof. Morse (1835) and the application of photography to portraiture by Prof. J. W. Draper (1839). The distribution of departments as now existing has occurred since 1895, with the opening of the buildings and grounds now called Univ. Heights, at Fordham, overlooking the Harlem valley. This beautiful site, acquired in 1891, extends from Sedgwick avenue to Aqueduct avenue, immediately south of University avenue, formerly known as E. One Hundred and Eighty-first street. The single tract included in the college campus comprises 22 acres; a portion called 'The Ohio Field' is set apart for athletics, and comprises a ¼ m. running track, with space for foot-ball, base-ball, etc.; there are also boating and bathing houses on the river front. Among the buildings on Univ. Heights, the most notable is the Central Building, containing a well-equipped library of nearly 60,000 vols., commencement hall, and administration offices, the cost of which was about $1,000,000; the adjoining colonade connecting with two of the halls, and surmounting a museum of 7 rooms on the ground floor, is the celebrated memorial Hall of Fame of Great Americans (q.v.); there are also the Hall of Languages, Charles Butler Hall, Havemeyer Laboratory of Chemistry, Laboratory of Physics and Engineering, Laboratory of Biology and Geology, Andrew H. Green Memorial Laboratory, Association Hall and Reading Room, Gymnasium, and residence halls, including Gould Hall, a 4-story building designed for 112 students and provided with music rooms, bicycle storage, etc. An 11-story building now occupies the Washington square site, the basement and 7 stories of which are leased for 25 years to the American Book Co., which furnishes heat, light, and elevator service to the upper floors, where are the chancellor's and treasurer's offices, the council room of the univ., and the univ. departments. In 1883 the univ. became independent of

the city govt., and while offices and departments are maintained at Washington square, the property is exempt from taxation. The buildings occupied by the medical dept. (originally known as the Univ. Medical College) on E. Twenty-sixth street, opposite Bellevue Hospital, were reconstructed 1887, have a frontage of 130 ft., and include the Loomis Laboratory and a dispensary where thousands of patients are treated annually.

The decade of 1890 to 1900 inaugurated a new era for New York Univ. In 1894 the College of Arts and Pure Science and the School of Applied Science were removed to Univ. Heights at Fordham. The Schools of Law and Pedagogy remained at Washington square. The Graduate School divides its work between these two places. Accompanying these changes in location of schools, a complete reorganization of the several schools into one univ. system was affected. In 1896, Mar. 19, the name was changed by the State Board of Regents to New York University. In 1897, the Medical Faculty was thoroughly reconstructed. Among the important incidents of the new movement, the following were especially notable: The consolidation with the univ. in 1895 of the Metropolis Law School; in 1898 of the Bellevue Hospital Medical College with the univ. school, under the new title of the Univ. and Bellevue Hospital Medical College; and in 1899 of the two veterinary schools of the city under the title of the New York-American Veterinary College. The School of Commerce, Accounts, and Finance was opened, and the Hall of Fame of Great Americans (q.v.) founded in 1900; in 1903 the college extension was established. A 3-years' course leads in univ. college to the degrees of B.A. and B.S.; in the law school (co-educational) covers the degrees of LL.B., LL.M., and J.D.; the medical college, together with the veterinary college, confers the degrees of M.D., D.S., and D.V.S.; the school of applied science, the degrees of C.E. and M.E.; the graduate school, the degrees of M.A., M.S., PH.M., and PH.D.; the school of pedagogy, the degrees of PD.M. and PH.D.: the school of commerce, accounts, and finance, the degree of B.C.S. (bachelor of commercial science). The faculties comprise over 200 professors and instructors, and there is an annual enrollment of over 2,000 students. The summer school has 12 instructors and is attended annually by over 100 students. The govt. of the univ. is vested in a senate comprising a chancellor, the deans of the schools, and 6 professors, elected one from each school, together with advisory members. The chancellors of the univ. have been James Mathews, D.D.; Hon. Theodore Frelinghuysen, LL.D.; Isaac Ferris, D.D., LL.D.; Howard Crosby, D.D., LL.D.; John Hall, D.D., LL.D.; and since 1891, Henry Mitchell McCracken, D.D., LL.D. The total value of the college property is over $5,025,500; the endowment over $2,080,000; and the gross income about $467,000.

NEW ZEALAND.

NEW ZEALAND, *nū zē'land:* British colony in the s. Pacific Ocean; consists of three islands, two large and one very much smaller, and of a number of islets scattered round the coasts; about 6,500 m. w. from the coast of S. Amer., and about 1,210 m. s.e. of Australia. The group is irregular in form, but may be said to extend from the s. in a n.n.e. direction, and, like the peninsula of Italy, resembles a boot in shape; lat. from 34° 15′ to 47° 30′ s., long. from 166° to 179° e.—thus almost the antipodes of the British Isles. The islands are named respectively North, South (sometimes also Middle), and Stewart's Island. North Island is about 500 m. long, and 200 m. in greatest breadth e. to w.; South Island (the largest) is 550 m. long, and 210 m. in greatest breadth—the average breadth of both islands being about 140 m.; Stewart's Island (the smallest) is triangular in shape, about 900 sq. m. Area of North Island 45,687 sq. m., South Island 57,379 sq. m., the Chatham Islands and the Auckland Island, e. and s., 377 sq. m.: total area about 105,000 sq. m., about one-sixth less than that of Great Britain and Ireland. The South Island has an area about equal to that of England and Wales. The North is separated from the South Island by Cook's Strait, 18 m. wide at its e. and 90 m. wide at its w. end; the South is separated from Stewart's Island by Foveaux Strait, averaging about 20 m. in width.

Coast-line.—Of the entire coast-line of about 4,000 m., nearly 1,500 m. is formed by the shores of North Island, which are deeply indented and contain many excellent harbors. Commencing from North Cape, and going s.e. round the island, the chief harbors are Monganui, Wangaroa, the Bay of Islands, Auckland, Mercury, and Tauranga bays, and the ports of Wellington, Manukau, and Hokianga. On the n. and s. coasts of South Island, which are much broken, the harbors are numerous and excellent; on the e. coast, the principal harbors are Akaroa, Victoria, and Dunedin. On the coasts of Stewart's Island, also, there are good ports.

Surface.—The N. Z. Islands are of volcanic origin, and a great portion of the entire area is occupied by mountains, among which are many extinct and a few active volcanoes. In North Island, Mount Ruaperhui, the highest summit of the central range, is 9,100 ft. in height, capped with perpetual snow. In the same range is Tongariro, an active volcano, 6,500 ft. high. A continuous range of mountains runs along the w. coast of South Island, and assumes the form of table-lands and isolated peaks toward the east. Its highest peak, Mount Cook (12,349 ft.), was first ascended 1882. Stewart's Island rises to about 3,000 ft. In North Island, the mountains are mostly clothed with evergreen forests of luxuriant growth, interspersed with fern-clad ranges, and occasionally with treeless, grassy plains; extensive and rich valleys and sheltered dales abound; and in the east of South Island are many expansive plains of rich meadow-land, admirably adapted either for agriculture or for

cattle-breeding. Water and water-power are in great abundance in the colony, and the numerous rivers are subject to sudden floods from the melting of the mountain snows. As a rule, however, the streams are short, and not navigable more than 50 m. above their mouths. The chief is Waikato river, in North Island, which, issuing from the Taupo Lake (30 m. long by 20 broad), flows n. 200 m., and reaches the sea on the w. coast. In South Island, the rivers Clutha, Mataura, and Waiau, all flowing s., are among the chief. Around Lakes Rotomahana and Rotorua are a number of grand and beautiful geysers, which throw up water heated to 2° above the boiling-point. The lakes are numerous, especially in the South Island, and some of them are of considerable size and surrounded by lovely scenery. The geology of N. Z. is very remarkable. The mountains, which are of every variety of outline, are composed chiefly of the lower slate-rocks, intersected with basalt and mixed with primary sandstone and limestone. There are beds of coal and lignite, and the coal has been to some extent worked.

Soil, Climate, and Productions.—Of the whole surface-extent of N. Z. (nearly 70,000,000 acres, little less than the combined area of England and Wales, Scotland, and Ireland), one-fourth is estimated to consist of dense forest tracts, one-half of excellent soil, and the remainder of waste lands, scoriæ-hills, and rugged mountain regions. Nearly 40,000,000 acres are supposed to be more or less suitable for agriculture and cattle-breeding. The soil, though often clayey, has in the volcanic districts more than a medium fertility; but the luxuriant and semi-tropical vegetation is perhaps as much due to excellence of climate as to richness of soil. Owing to the prevalence of light and easily worked soils, all agricultural processes are performed with unusual ease. The climate of N. Z. is one of the finest in the world. The country contains few physical sources of disease; the average temperature is remarkably even at all seasons of the year, and the atmosphere is continually agitated and freshened by winds that blow over an immense expanse of ocean. The climate resembles that of England, with half the cold of the English winter; while the summer is longer and somewhat warmer, the atmosphere is more breezy and pure, and there are many more fine days throughout the year. In North Island, the mean annual temperature is 58°; in South Island 52°. The mean temperature of the hottest month at Auckland is 68°, and at Otago 58°; of the coldest month, 51° and 40°. The air is very humid, and the fall of rain is greater than in England, yet there are more dry days. All the native trees and plants are evergreens. Forests, shrubberies, and plains are clothed in green throughout the year, the result of which is that cattle, as a rule, browse on the herbage and shrubs of the open country all the year round, thus saving great expense to the cattle-breeder. The operations of reclaiming and cultivating land can be carried on

at all seasons. All the grains, grasses, fruits, and vegetables of the warmer temperate countries are cultivated in N. Z. with perfect success, being excellent in quality and heavy in yield; while, besides these, the vine is cultivated in the open air, and corn, the taro, and the sweet-potato are cultivated to some extent in the sunny valleys of North Island. The entire acreage under crop in N. Z. (1901) including 11,620,178 acres in sown grasses, was 13,083,971. The principal crops were wheat, oats, barley, potatoes, and sown grass, which, under ordinary circumstances, are grown to great advantage in N. Z. Besides a few harmless lizards, a small species of rat is the only indigenous four-footed animal found in either of the great islands. The country is destitute of snakes, and possesses no insect so noxious as the English wasp. The pig, introduced by Cook, runs wild; and the red and fallow deer, the pheasant, partridge, quail, etc., and the commoner domestic animals introduced by colonists, thrive well. In 1902, there were in the colony 279,692 horses, 1,361,784 cattle, 20,233,099 sheep, 224,024 pigs, and 1,323,542 heads of poultry, besides mules, asses and goats. Coal in abundance, and of good quality, as well as iron, gold, silver, tin, copper, etc., are widely distributed. Supplemental to farming and stock raising are meat freezing, preserving, boiling down, tanning, wool-scouring, shoe, butter and cheese factories, cloth and flour mills, and there are also iron and brass works, saw mills, etc. The total number of manufacturing establishments is about 3,200, employing over 41,700 work people, an invested capital of about $40,000,000 and having an annual output estimated at about $85,000,000. The most important export is wool which averages about $20,000,000; gold is the next valuable export, others are grain, frozen meat, tallow, timber and Kauri gum. The annual value of the exports averages about $63,452,300, of the imports $59,089,575. Over 2,500 m. of railway, and 7,300 m. of telegraph lines all state-owned are in operation and more under construction. Public ownership of the chief municipal and state services is well developed in N. Z.

The colony was divided into the following nine provinces: Auckland, Taranaki, Wellington, Hawke's Bay, Nelson, Marlborough, Canterbury, Otago, and Westland. The provinces were abolished by the colonial parliament 1875, and a system of counties substituted. The counties now number 63. The govt. is administered by a gov. appointed by the crown, and a ministry, a legislative council of members appointed for life by the gov., and a house of representatives elected by the people on a basis of manhood suffrage. Power for disallowance of legislation vests in the crown, but is scarcely ever exercised. The chief educational institutions are the Univ. of New Zealand (which grants degrees) and the

Univ. of Otago, and Canterbury College; with numerous high schools, for higher and secondary education. Besides these, the primary schools supported by the state number over 2,100 with 153,870 pupils. The principal churches are the Church of England, predominating in Canterbury; the Presb. Church, which predominates in Otago; the Wesleyan; and the Rom. Catholic.—The military forces of N. Z. are the volunteers, numbering about 8,500; and there are armed constabulary in the North Island.

N. Z. was discovered by Tasman 1642, and was repeatedly visited by Capt. Cook, who surveyed the coasts 1770. After the settlement of Port Jackson, in New South Wales, the English and American whaling-ships had recourse to the coasts of N. Z. for provisions and shelter. N. Z. flax came also to be an article of traffic, and individual Englishmen began to settle on the coasts, and intermarry with the natives, and acquire land in right of their wives or of purchase. Missionary enterprise began 1814, favored by various chiefs, and the missionaries not only labored to convert the natives, but also introduced improved culture among them, and tried to protect them from the injustice, fraud, and oppression of the Europeans that had acquired settlements. A British resident or consul was appointed 1833, but without authority. To put an end to the anarchy induced by a desultory colonization and the purchase of lands for a few hatchets or muskets, a lieut.gov. was appointed 1840, and a treaty concluded with the native chiefs, whereby the sovereignty of the islands was ceded to Britain, while the chiefs were guaranteed the full possession of their lands, forests, etc., so long as they desired to retain them: the right of preëmption, however, was reserved for the crown, if they wished to alienate any portion. Thus N. Z. became a regular colony, the seat of govt. of which was fixed on the Bay of Waitemata, and called Auckland. The previous year an association, called the New Zealand Company, had made a pretended purchase of tracts amounting to a third of the whole islands; and for a dozen years most of the colonization of N. Z. was conducted under its auspices. The conduct of the company is considered to have been, on the whole, prejudicial to the prosperity of the colony; and, after a long conflict with the govt., they resigned 1852 all their claims—which the govt. had never confirmed — on condition of receiving £268,000 as compensation for their outlay. The unscrupulous way in which the company and others often took possession of lands brought on, 1843–47, a series of bloody conflicts with the warlike natives, whose hostility, after having subsided for some time, in 1861 again broke out in a series of intermittent struggles. These continued until, on the withdrawal of the imperial troops, the colonists, from their knowledge of bush life and intensified earnestness, completely subdued the refractory natives, who are now turning their attention to

agriculture and trade. In 1852 constitutional govt. was established, and 1865 the seat of govt. was transferred from Auckland to Wellington (q.v.), the present capital.—The chief cities are Dunedin (q.v.), Auckland (q.v.), Christchurch (q.v.).

The New Zealanders, or Maories (q.v.), mostly in North Island, are supposed to have been 120,000 in number when the colonists landed. In 1881 the census showed them to be 44,099—an *increase* as compared with 1871. In 1901 immigrants into New Zealand amounted to 25,086 persons; emigrants from it, 8,564. Pop. (1858) 59,328; (1881) 489,933; (1891) 668,353; (1901) 815,862.

NEW ZEA'LAND FLAX: see FLAX, NEW ZEALAND.

NEXT, a. *nĕkst* [AS. *neah*, near; *nehst*, next]: nearest in place; nearest in time, place, degree, or rank; having no object intervening between it and another: AD. immediately succeeding, or at the time or turn nearest, almost—as, 'the matter is *next to* impossible.' NEXT DOOR TO, close to; not far removed from anything. NEXT FRIEND, in *law*, person in whose name, or rather by whose agency, an infant—i.e., a person under the age of 21—sues in the courts of law and equity. The object is chiefly to have some party that can be held for costs in case the infant fails in the action. In practice, the father, if alive, is usually the next friend, but any substantial person may be so. In the court of chancery, a married woman sues or appears by the intervention of a next friend, where she is personally interested. NEXT OF KIN, the nearest in relationship, whether of consanguinity or affinity. NEXT PRESENTATION, the right to present a clergyman to the next vacancy of a benefice only, and not an advowson or perpetual right. *Note.*—NEXT may frequently be regarded as a prep. when followed by *to*, expressed or understood, as, 'you are *next to* him.'

NEXUS, n. *nĕks'ŭs* [L.]: connection; tie.

NEY, *nā*, MICHEL: famous marshal of the first French empire: 1769, Jan. 10—1815, Dec. 7; b. Saar Louis; son of a cooper. He was a non-commissioned officer in a hussar regt. when the Revolution began, and afterward rapidly rose to high military rank. For the capture of Mannheim by a *coup-de-main*, he was made a gen. of division 1799. He was interim commander of the army of the Rhine for a short time, during which he frustrated by a bold diversion an important movement of Archduke Charles against Massena and the army of Switzerland. After the peace of Lunéville, Bonaparte, anxious to win N., with other republicans, to his party, brought about his marriage with a young friend of Hortense Beauharnais, and appointed him inspector-gen. of cavalry. On the establishment of the empire, he was made a marshal. In 1805 he stormed the intrenchments of Elchingen, and was created Duke of Elchingen. He afterward rendered important services in the Tyrol; contributed much to the French successes of 1806 and 7; and served in Spain

with great ability 1808 and 9, till he was dismissed by Massena, commander-in-chief, on a dispute about the plan of the campaign. Chagrined by this, and dissatisfied with Napoleon's despotism, he remained inactive; but 1812 received the command of the third *corps d'armée*, and greatly distinguished himself at Smolensk and the Moskwa, in consequence of which he was created prince of the Moskwa. He showed great abilities also in the French retreat. He had a principal part in the campaigns of 1813,4; but after the capture of Paris he urged the emperor to abdicate, and submitted to Louis XVIII., who loaded him with favors. On Napoleon's return from Elba, N. assured the king of his fidelity, and was sent against Napoleon at the head of 4,000 men; but impelled by his old memories, and finding the emperor received with general enthusiasm, and his own soldiers favorable to his cause, N. went over to his side. In the battle of Waterloo, he commanded the centre, and had five horses shot under him. After the capitulation of Paris, it is said that a costly Egyptian sabre, the gift of Napoleon, led to his being suspected by an official, and arrested. He was tried by the house of peers, and by a vote of 169 to 17 was condemned to death for high treason, and was shot in the garden of the Luxembourg two days afterward. He left three sons, who published his *Mémoirs* (2 vols. Par. 1833).—N. was a brave and honest man, guilty of a divided allegiance in those dismal days when his country itself scarcely knew from month to month to whom its allegiance was due.

Strangely, the question has recently been propounded, in all seriousness, whether Marshal N. lived in Davie co., N. Carolina, and died in that state 1846, Nov. 15, more than 30 years after the reported death-scene in the garden of the Luxembourg. By certain investigators it is asserted that the sentence of death was meant not for execution, but for popular effect; that N., without collusion on his part, was spirited away unharmed, but as a dead man; that he was hurried on board ship, and found himself landed at Charleston, S. C., 1816, Jan. 29; that he supported himself by teaching for many years; that his secret was well kept, except as far as it was allowed to escape in one or two unguarded utterances, and except its constant liability to detection through his noticeable personality and his evident lifelong intimacy with the rulers and the political scenes of Europe in the generation previous; and that his grave may now be seen in Third Creek churchyard, Rowan co., N. C. The story, though it may be judged not proved, is certainly strange enough to be true. (See an article in the *Independent*, New York. 1887, June 23.)

NEZ PERCÉS, *nā pār-sā'*, or SAHAP'TINS: tribe of Indians formerly occupying portions of Washington and Oregon, and now on reservations in Idaho and Indian Territory. They made a treaty with the members of the Lewis and Clarke expedition about 1805. The American Board sent missionaries among them 1836, who opened schools and taught the rudiments of agriculture. An epidemic of the measles, 1847, destroyed large numbers; one of the missionaries was murdered by another band of Indians, and the mission was broken up. The tribe has usually been friendly to the whites, was demoralized by gold-miners 1859, but has improved under the influence of a Presb. mission. A portion of the tribe did not accept the treaties, and have no settled place of abode. The others are peaceful and prosperous. Several books have been published in their language.

N'GAMI, *ngâ'mē*, LAKE: lake in the interior of Africa; between the 20th and 21st parallels s. lat., and between the meridians 22° 10′ and 23° 30′ e. long.; about 2,500 ft. above sea-level. It lies n. of the Kelahari Desert (q.v.) in Western Rhodesia, and when first visited by Europeans was about 70 m. long by 20 m. wide, and from 3 to 28 ft. deep. Since 1890 the waters have gradually disappeared, leaving extensive reedy swamplands, along the borders of which corn is grown. The existence of lakes in the interior of Africa was vaguely known as far back as the days of Herodotus; and the earliest modern maps show at least half-a-dozen large and small, one of which is about the size, and very nearly in the position, of that shallow reservoir of surface drainage which was discovered, or at least first visited, by a European 1849, when Dr. Livingstone and Mr. Oswell, who were aware of its existence from native report, reached its shores by a circuitous route from the Cape Colony. Although since ascertained to be of little importance in the physical geography of these regions, Lake N. was at first supposed to be in some way connected with the larger inland seas of Nyassa, Victoria N'yanza, and Tanganyika. In 1853 Lake N. was reached from the w. coast, near Walfish Bay, by the traveller Andersson; and there is now a well-beaten route for traders between these two places, and a considerable quantity of ivory and ostrich feathers are annually collected in the neighborhood of the lake. The principal characteristics of the region are rivers with very sluggish current. The water of N. was generally fresh, but in the dry season became brackish. The e. end was much deeper than the w., and it has been inferred that during the 18th century the shape and size of the lake underwent material alterations. The chief tributary, the Tonke or Tioge, coming from the n.w., is deep, and in June, July, and Aug. brings down vast volumes of water. The Suga or Zouga, the main outlet, flows s.e., and finally disappears in a large salt-marsh.

NGAN-KING, *ngân-kĭng′:* large and wealthy city of China, cap. of the province of Ngan-whi; on the left bank of the great river Yang-tze-Kiang, 190 m. s.w. from Nanking. The surrounding country is highly cultivated and very densely peopled. The mineral riches of the neighborhood are considerable. N. is a place of busy trade, great part of the goods intended for Nanking passing through the hands of its merchants. The trade is carried on by means of vessels on the river. Porcelain and cloth are among principal articles of trade.

NGAN-WHI, *ngân-hwē′*, or NGAN-HOEI, *ngân-hwā′*, or GAN-HWAY, *gân-hwā′ :* province in the interior of China; between lat. 29° and 34° n. and long. 115° and 119° e.; surrounded by the provinces of Kiang-Soo on the n.e.; Che-Kiang, s.e.; Kiang-See, s.; Hoo-Pee, w.; and Hoo-Nan, n.w.; 48,461 sq. m. Except in the s. and w., where there are ranges of hills of moderate elevation, the surface is level. It is crossed by the large rivers Hoai-Ho and Yang-tze-Kiang, which have numerous tributaries; and there are several lakes of considerable size, of which the largest is Chan-Hu. There is much mineral wealth, and gold, silver, and copper, with other metals, are mined. Of the various manufactures, varnish, lanterns, and ink are most imported. The best quality of green tea is grown in the s. part of the province.

NGORNU′: see ANGORNOW.

NIAGARA FALLS: a city, Niagara co., N. Y.; on Niagara river, and on the New York Central and a branch of the Erie railroads, 22 m. n.n.w. of Buffalo; connected with opposite bank of the river by a suspension bridge, from which a fine view of the great cataract is given; another bridge connects it with Goat Island. It has flouring-mills, sash-and-blind factories, etc. Pop. (1910) 30,445.

NIAG′ARA RIVER—NIAG′ARA FALLS: short stream —and its stupendous cataract—flowing from Lake Erie northward into Lake Ontario; about 33 m. in length, and its descent from the level of one lake to that of the other is about 328 ft. It is really a part of the great St. Lawrence river and lake system. The name Niagara in the Indian tongue means ‘thunder of waters.’ Issuing from Lake Erie, it is three-quarters of a m. broad; but as it flows on, it becomes several m. wide, making room for a number of islands, the largest of which, Grand Island, is 12 m. long and 2 to 7 broad. At the foot of Grand Island, which reaches within 1½ m. of the *Falls of N.*, the river is contracted to a breadth of 2½ m., and grows narrower as it proceeds. By this, and by the descent in the channel, about 60 ft. in the m., above the Falls, are produced the swift currents known as the *Rapids*, in which the river, notwithstanding its great depth, is perpetually white with foam. At the Falls, 22 m. from Lake Erie, the river has a breadth of 4,750 ft.; but its centre is occupied by an island containing about 75 acres, called Goat Island, 40 ft. above the water; but in consequence of a bend in the channel, by far the larger por-

tion of the water is sent down by the Canadian side. Goat Island having a breadth of about 1,000 ft., is separated from the American shore about 1,400 ft., and from the Canadian about 2,800 ft.; but the breadth of the Canadian Fall is increased by an upward bend in its line. On this side, therefore, is the grander cataract, which has been named the *Horseshoe Fall*, but no longer bears the name appropriately, as the precipice has been worn from a curved into a somewhat angular shape. This process of wearing away still goes on gradually, a large projection on the Canadian bank, known as Table Rock, having partly fallen off 1850 and 63. The Horseshoe Fall is about 150 ft. in height. The water is so deep that it retains its green color some distance below the brow of the precipice; and it rushes over with such force that it is thrown about 50 ft. from the foot of the cliff. One may thus, having donned an oilskin dress, enter a short distance behind the curved sheet of water; but the spray is so blinding, the din so deafening, and the current of air so strong, that it requires a calm nerve and firm foot: this recess is known as the Cave of the Winds. The separation caused by Goat Island leaves a large wall of rock between the Canadian and American Falls, the latter being again divided by an islet at a short distance from Goat Island. This narrower fall is higher than the Horseshoe by about 14 ft. A little above the Fall, the channel is divided by Bath Island, which is connected by bridges with Goat Island and the American shore. A small tower, approached from Goat Island, long stood on a rock over the brow of the Horseshoe Fall, giving the finest view on the American side, the Table Rock on the Canadian side giving the completest view of the entire cataract. The Falls can be seen also from below on both sides, and every facility is given for viewing them from all the best points. The discharge of Niagara Falls is computed at about 18,000,000 cubic ft. per minute. Below the Falls the deep basin excavated by the downpour extends for 1½ miles forming a vast reservoir with scarcely any perceptible current, and so smooth that venturesome swimmers and small rowboats cross, and a small pleasure steamer makes half-hour trips to within a few feet of both cataracts. The waters escape through the celebrated gorge with its midway whirlpool and boiling rapids, along the U. S. edge of which an electric trolley line affords splendid views, and connects by the Queenstown bridge with the Canadian heights above the gorge; 4 fine bridges span this 7 m. stretch of river in its descent of 104 ft., varying from 750 to 1,200 ft. wide, and flowing

through a ravine with perpendicular banks 200 to 350 ft. high. At Lewiston, this gorge ends, and the river passes on its peaceful course to Lake Ontario. There are various theories about the rate and the direction of the wearing-away of the rocks by the great cataract: whatever value may attach to this guess-work, it is certain that since the Falls were seen first by Jacques Cartier, 1535, and were described first by Father Hennepin, 1678, the changes in aspect have been many and great. Some early writers mention as many as six different falls.

THE NEW YORK STATE PARK AT NIAGARA FALLS is the official designation of a reservation on the American side of the Niagara river, near the Falls. It embraces a strip of land 100 to 200 ft. wide and about a mile in length, also including the old Prospect Park, and Goat, Bath, Bird, Luna, and other islands in the river; total area about 110 acres. Public attention was called to the desirability of opening a park at this point first by Gov. Robinson of N. Y., in a message to the legislature 1879, in which he recommended that a suitable area be purchased by the state and made free to the public, thus avoiding the annoyances and exactions to which visitors were subjected. A commission was appointed, which reported favorably. In 1883 the legislature authorized the gov. to appoint commissioners who should locate and appraise the lands required. The state subsequently purchased the land for $1,433,429.50; and 1885, July 15, the park was opened to the public, with imposing ceremonies. It is under the care of commissioners, whose expenses are paid, but who receive no salary. The ground has been cleared of unsightly buildings and fences, and various other improvements have been made. Admission is free, and visitors can obtain all needed information at the reception-house in the old Prospect Park. Similar action was taken by the Canadian govt., and a strip of land nearly two miles long was purchased, and, under the name Canadian Niagara Falls Reservation, was opened 1887.

NIAGARA FALLS, ELECTRIC POWER FROM: the great cataract put to a new service. The first use of this immense water-power was made by a primitive saw-mill, 1725. Nearly 120 years later Augustus Porter conceived the plan of hydraulic canals, and by 1861 the first of these was in operation; another, which furnished 6,000 horse-power to several mills, was completed 1873. The idea of utilizing water-power to generate electricity was first publicly suggested in 1876, during the visit of Sir William Siemens to Niagara, and the pioneer to turn it into practical use was Lord Armstrong. Ten years later the Niagara Falls Power Company, formed to utilize this water-power, was incorporated. It was followed (1889) by the Cataract Construction Company, which began operations 1890, Oct. 4. This company cut a canal, 100 ft. to 250 ft. wide and 12 ft. deep, from the Niagara river at Port Day, 1¼ miles above the falls, 1,200 ft. in length. The canal connects with a tunnel through shafts. The tunnel, the outlet of

which is almost beneath the suspension bridge, runs under the village of Niagara Falls and is cut through rock 200 ft. below the ground-level. Its total length is 7,520 ft.; its height 19 ft., width 21 ft. It has a cross-section area of 386 sq. ft. In shape its section resembles a horseshoe. The vertical shafts, or wheel-pits, which connect the canal and tunnel are cut in solid rock and sunk to a depth of 178 ft. They are 21 ft. wide and 140 ft. long. Near the bottom of these shafts turbine-wheels, driven by the water from the canal, are set, and at the bottom lateral tail-races connect the shafts with the tunnel. The water running along the tail-races passes into the tunnel, through which it flows to the river. But the water does not flow to the turbines directly from the river. It runs along the canal and through steel shafts, or penstocks, into them. The turbines are of 5,000 horse-power and operate electric generators of the same energy. The first practical test of the hydraulic tunnel was made 1894, Jan. 25; and the first distribution of power in 1895, Aug., to the plant of the Pittsburg Reduction Co. In drilling the tunnel over 300,000 tons of rock were removed, and that work, together with the brick lining, engaged 1,000 men about 3 years. No less than 16,000,000 bricks were used for lining. Among others using some of the power developed by the falls are the Calcium Company, Buffalo and Niagara Railway Company, and the Niagara Falls Electric Lighting Company. In 1895, December, the city of Buffalo granted a franchise to the Niagara Falls Power Company to supply power to that city—the terms being that it furnish 10,000 horse-power to consumers by 1896, June 1, and additional 10,000 horse-power in each successive year. At midnight 1896, Nov. 15, the Niagara Falls electric power was first flashed over the wires to Buffalo, 18 miles distant. That city is now lighted by electricity generated at Niagara, and its water-works and street cars, as well as various industries, are operated by the same means.

The success of the Niagara Falls Power Company led to the organization of the Niagara Falls Hydraulic Power and Manufacturing Company to install a developing plant of 80,000 horse-power; of the Lower Niagara River Power Company taking its water from the Whirlpool Rapids for a plant producing 200,000 horse-power; and the Niagara Irrigation and Water Supply Company to cut a rock canal 37,000 feet long from La Salle on the Upper Niagara River to Devil's Hole in the Gorge for a developing plant of 320,000 horse-power.

On the Canadian side, supplementing the small plants of the International Railway Company and the Hamilton Cataract Power, Light and Traction Company with a combined capacity of 17,600 horse-power, the Canadian Niagara Power Company has installed a 110,000 horse-power equipment, and the Ontario Power Company a 180,000 horse-power plant, one of its power houses being located in the gorge at the edge of the pool near the Horseshoe Falls.

While the neighborhood of the Falls, and Buffalo, 26 miles distant is the only large city deriving the benefits of the Niagara Power, the maximum distance to which power can be economically transmitted under favorable conditions is calculated at 550 miles. In May, 1896, 1/30th of a horse-power was successfully transmitted from Niagara Falls to the Electrical Exposition in N. Y. City (453 miles), to operate a model of the Niagara Falls Power Company's plant. An extensive transmission into the U. S. is projected by the Canadian companies and power transmission lines are being extended eastward from the cataract by the Niagara, Lockport and Ontario Power Co., which receives the electric current from the Ontario Power Co. at the boundary line of the Niagara gorge.

The energy provided by the Falls is estimated at 16,000,000 horse-power. The aggregate energy of the plants in operation and in course of construction (1905) is under 800,000 horse-power. Scenic lovers, fearful of the destruction of the natural beauties of the neighborhood and the 'depletion of the cataract' by the increase of power plants, have turned 'Preserve Niagara' into an international political cry. In 1905, the American Civic Association adopted a resolution that 'the people of the whole American continent are vitally concerned in the preservation of Niagara Falls' and requested 'the President of the United States and the Governor-General of Canada to appoint a joint commission to consider and report upon immediate measures to preserve this greatest cataract in all its beauty and grandeur.'

A practical method to save Niagara River from being reduced to a stream of uncertain width at the center of the Canadian channel and from being entirely diverted from the American fall was advocated by Alton D. Adams in the *Technical World*, Oct., 1905. The plan proposed was to raise Niagara River 100 feet by building a dam less than 1,000 feet long near the brow of the escarpment across the mouth of the gorge. A storage reservoir six miles long extending back to the Whirlpool Rapids would be formed, which with a drainage of 150,000 sq. m. of territory would develop 1,500,000 electric horse-power, without altering the character of the great Cataract above, while at the dam it would create another cataract two-thirds of the height of the present, with a volume equal to that of both the American and the Horseshoe Falls. Direct results of the great power development at this dam would be to prevent multiplication of the canals, pipe lines, and tunnels that threaten to reduce the Upper Niagara River, while Lewiston and Queenstown would become centers for great power houses.

NIB, n. *nĭb* [Scot. *neb*, a sharp point: Norw. *nibba*, a sharp projecting rock: Icel. *nibba*, a promontory (see NEB)]: the point of anything, particularly of a pen; the beak of a bird. NIBBED, a. *nĭbd*, having a nib or point.

NIBBLE, n. *nĭb'bl* [Dut. *knabbelen*, to nibble, to grumble: Ger. *knaupeln;* Low Ger. *knibbeln*, to gnaw, to nibble: Swiss, *knübeln*, to pick]: a little bite: V. to bite by little at a time; to continue to bite at gently and quickly, as a fish the bait; to carp at; to find fault with. NIB'BLING, imp. *-blĭng:* ADJ. biting or feeding by nibbles N. a little bite; act of one who nibbles. NIBBLED, pp. *nĭb'bld.* NIB'BLINGLY, ad. *-blĭng-lĭ.* NIB'BLER, n. *-blĕr*, he or that which nibbles; a carper.

NIBBY, *nēb'bē*, ANTONIO: Roman archæologist of high celebrity: 1792–1839, Dec. 29. He was one of those who, following Winckelmann, made an elaborately minute investigation of the remains of antiquity their special study. The first work that made him known was his translation of Pausanias, with antiquarian and critical notes. In 1820 he was appointed prof. of archæology in the Univ. of Rome. In the same year appeared his ed. of Nardini's *Roma Antica;* and 1837–8 his learned and admirable *Analisi Storicotopografico-antiquaria della carta de Contorni di Roma*, to which was added (1838–40) a description of the city of Rome. Among his writings are *Le Mura di Roma disegnate da W. Gell*, and a large number of valuable treatises on the form and arrangement of the earliest Christian churches, the Circus of Caracalla, the Temple of Fortuna at Præneste, the graves of the Horatii and the Curiatii, etc.

NIBELUNGEN LIED, n. *nĭb'ĕl-ŭng'ĕn lēd*, or '*Nibelunge Not*,' as the words are written in the oldest manuscripts: the 'Lay of the Nibelungen'—the most ancient existing monument of German epic poetry, forming the chief traditionary record of the romantic deeds and sentiments of the heroes of German folk-lore—one of the most finished specimens of the genuine epic of Germany belonging to the middle ages. It is in the Middle High German dialect. There are 20 more or less perfect manuscript copies of this curious poem, the earliest of which belong to the beginning of the 13th c., from which period till the middle of the 16th c. it had the greatest popularity among Germans of all classes. Nothing is known of the author or authors of the work beyond the fact that it was put into its present form by a wandering minstrel in Austria about or before 1210, the date of the oldest accredited manuscript. According to W. Grimm and Lachmann's critical analysis of the poem, it is in itself a compilation of pre-existing Norse songs and rhapsodies, strung together into one whole on a plan remarkable for grand simplicity, though less skill is shown in some instances in the manner in which the several parts are connected. In the more authentic MSS., the poem consists of only 20 parts; and it is conjectured that the latter portions of the epic,

given only in some of the texts, as that of St. Gall, are from later compilers. The epic cycle embraced in the N. may be more specially regarded as the fusion of the history of the mythical people, called in the poem the Nibelungen, with five leading groups of myths, in which are incorporated the adventures of some of the most universally popular personages belonging to the semi-historic mediæval German folk-lore—e.g., the hero Siegfried, with his mantle of invisibility, and the lovely Icelandic heroine Brunhilt; King Günther of Burgundy, and his fair sister Kriemhilt, wife of Siegfried; Haco of Norway, Dietrich (Theodoric the Great, King of the Ostrogoths) of Berne (Verona), and Etzel (Attila), King of the Huns. The loves and feuds and the stormy lives and violent deaths of these national heroes and heroines are skilfully intertwined in the N., and artistically made to centre round the mythical treasure of the Nibelungen, which, after the murder of Siegfried, who had brought it from the far north, is secretly buried by his murderer Haco beneath the Rhine, where it still remains. The poem, in its rude but strict versification, tells the tale of Kriemhilt's vengeance for her husband's death with a passionate earnestness that carries the sympathies of the reader with it, until the interest culminates in the catastrophe of the fierce battle between the Burgundians and Huns at the court of Etzel, whose hand Kriemhilt has accepted, the better to accomplish her purposes of revenge. The tale of horrors fitly closes with the murder of Kriemhilt herself, after she has satisfied her vengeance by slaying with Siegfried's sword his murderer Haco. This tale kept firm hold on the imaginations of the people, till the taste for polemic writings, fostered, if not created, at the period of the Reformation, caused this as well as many other treasures of folk-lore to be almost forgotten. Attention was, however, again drawn to it in the 18th c., by the publication of detached portions of the poem by Bodmer, *Chriemhilden-Rache* (Zurich 1751), and by Müller in his *Sammlung deutscher Gedichte aus dem* 12.—14. *Jahrh.* (Berl. 1782); but it was not till comparatively recent times that the value of the work in an historical and philological point of view was recognized. Lachmann made known the result of his investigations 1826. His views were supported by Müllenhoff and Rieger (1856). Holtzmann (1854), on the other hand, asserted that the longest version is the more ancient, and was followed by Zarncke, Hermann, and Fischer. Pfeiffer tried, 1862, to prove that the author of the present N. was the Austrian Von Kürenberg (about 1140). See Paul's statement of the case in *Die Nibelungenfrage* (1877). All the MSS. of the N. comprise another poem, under the title of *Die Klage*, which treats of the burial of the heroes who fell in the conflict at Etzel's court, and the laments composed in commemoration of that event. It is of greater antiquity than the N., and, like it, the work of an unknown author. A critical analysis of the N. is in Carlyle's *Miscellaneous Essays*.

NICÆ'A. See NICE.

NICARAGUA, *nĭk-a-râ'gwâ,* or *nē-kâ-râ-gwâ,* REPUBLIC OF: a country of Central America, bounded on the north by Honduras, on the east by the Caribbean Sea, on the south by Costa Rica, and on the southwest and west by the Pacific Ocean. Its area, according to conservative estimates, was formerly given as 40,000 square miles; including Mosquítia (see next paragraph) it is approximately 49,000 square miles.

Political Divisions.—The departments enumerated in the presidential decree of 12 Dec. 1902 were: León, Granada, Managua, Chinandega, Rivas, Masaya, Matagalpa, Carazo, Jinotega, New Segovia, Chontales, and Zelaya—the last including, for the purposes of that decree, the territories of Cape Gracias á Dios and San Juan del Norte. The strip of Caribbean coast now called Zelaya was formerly the Mosquito Reserve, or Mosquítia, a British protectorate; but Great Britain has gradually withdrawn in Nicaragua's favor her claim to exercise jurisdiction there. This eastern coast is now regarded as one of the most valuable parts of the republic; it contains gold mines, its fruit industry is already profitable, large plantations of rubber trees are being cultivated, and rosewood, cedar, and mahogany are taken from its forests.

Physical Geography.—The Sierra de los Morabios, running from the Gulf of Fonseca to the western shore of Lake Managua, appears to be the centre of volcanic energy in Nicaragua. It has the following vents: Cosigüina (famous on account of the terrific explosion of 2 Jan. 1835), Chonco, El Viejo (quiet since 1684), Santa Clara, Telica, San Jacinto, Rota, Las Pilas (eruption in 1850), Asososca, and Momotombo (eruptions in 1870 and 1886); and though only two of these may be described as active, the others are dormant, rather than extinct. This ridge is near the Pacific coast, and its southeasterly trend is continued by the isolated volcanoes Masaya (active), Apoyo (extinct), Mombacho, Ometepe, and Madera (extinct). The two last are on an island near the western shore of Lake Nicaragua, and but a few miles from the nearest point in Costa Rica. In other words, practically the entire Pacific coast range is intensely volcanic; the only exception being found at Brito and the neighborhood southwest and south of Ometepe and Madera, where, according to the views of some geologists, the 'internal fissure in the earth's crust that gave rise to the several volcanic vents of Central America' is 'completely built up and healed. Hence the low gap in the grand American cordillera found at that place, which has a mean height of about 150 feet above sea-level, the lowest gap from Alaska to Terra del Fuego.' Through this gap, over this 'healed fissure,' the Nicaragua Canal was to have been cut. The volcanic characteristics are not found far inland, but are restricted almost entirely to the western border; never-

theless the principal cities are built in this narrow strip of land between the Pacific and the lakes. Chinandega, near the coast in the northwest, has 20,000 inhabitants; León, 45,000; Managua, capital of the republic, 30,000; Masaya, 20,000; and Granada, on the west shore of Lake Nicaragua, 25,000. Of these the largest and most beautiful city, León, contains the cathedral of St. Peter which, it is said, was built at a cost of $5,000,000 when labor was valued at 25 cents a day. From the roof of this great church can be seen in one view 13 volcanoes. In the central region the largest town is Matagalpa (4,000). The western strip, despite its insecurity and oppressive climate, has been preferred as a place of residence by the majority of the Nicaraguans on account of its facilities for communication and transportation—among which are to be reckoned the great lakes, Nicaragua (over 100 miles long) and Managua (about 35 miles), connected by a river which could, without difficulty, be rendered navigable. The greater part of the republic, stretching eastward from the lakes to the department of Zelaya, is of a different geologic formation. It is covered with a chain of mountains of moderate height, and transverse spurs which are not volcanic extrusions but Antillean folds (see CENTRAL AMERICA). Many parts of the central uplands are comparatively cool and well watered, with very rich soil and nearly untouched treasures in forest and mine; but they have remained undeveloped hitherto chiefly on account of the lack of good roads. The earthquake shocks of Nicaragua are less severe than those of Guatemala and Salvador, and dangerous fevers prevail chiefly, though not exclusively, in the lowlands or near stagnant water. The large rivers, rising in the central mountains and emptying into the Caribbean Sea, are the Segovia, also called Coca or Wanks, which forms the boundary with Honduras, the Grande, the Kurringwas, and the Bluefields, near whose mouth is the town of Bluefields (pop. about 2,000). The San Juan flows from Lake Nicaragua to the Caribbean, and in part forms the boundary with Costa Rica on the south. The route of the Caribbean section of the canal, for which the waters of the San Juan would have been utilized, included a cut through Costa Rican territory west of Ochoa.

Mineral Resources.—Among the Central American republics, Nicaragua ranks second (Honduras being first) in respect to mineral wealth. Gold and silver are found in the departments of New Segovia, Chontales, Zelaya, León, Matagalpa, and Jinotega; copper in León, New Segovia, and Matagalpa; lead and iron in New Segovia and Matagalpa; mercury, salt, sulphate of lime, sulphur, and combustible minerals in León; tin in New Segovia; nickel and zinc in Matagalpa. There are more than 500 mines registered with the Bureau of Statistics, of which 494 are producers of gold. Silver and copper mines and stone quarries are scattered throughout the republic.

Forests, Agriculture, and Fauna.—The forests produce

rubber, mahogany, ebony, cedar, quebracho, light rosewood, mora, brazilwood, vanilla, sarsaparilla, vegetable wax, ipecacuanha, quinquina, copaiba balsam, rhubarb, etc. In many parts of the republic—near both coasts, in the valleys, on the slopes and plateaus near the lakes and rivers—soils of exceptional value for agricultural purposes are found; and though the system of cultivation is rudimentary, extraordinary results are sometimes achieved. Thus, it is said on good authority that sugarcane produces at least two annual crops, and sometimes three; cotton planted in October is picked the following February on all the western lands; the virgin soil of the eastern slope yields four crops of maize in a year; and indigo can be cut three times before replanting becomes necessary. Coffee thrives best at elevations between 2,000 and 3,000 feet above sea-level. Rice produces abundantly on central and eastern slopes. The systematic cultivation of rubber has been undertaken recently. Bananas are grown in the west, principally in the departments of León and Managua, for home consumption; in the east, on a large scale, for export. The annual yield of cacao is insufficient to supply the local demand; in quality, however, it is so excellent that it brings a higher price in the home market than the imported chocolates. Tobacco and aguardiente (made from sugarcane) are government monopolies. A large number of the coffee estates are controlled by Germans. The fauna includes the puma, deer, jaguar, monkeys, alligators, armadillos, ant-eaters, guatuso, peccaries or wild hogs, and many species of reptiles. There are large herds of cattle. Prominent among avifauna are macaws, parrots, buzzards, wild turkeys, and humming-birds.

Commerce.—Exports consist principally of coffee, rubber, bananas, coined silver, coined gold and gold in bars, gold ore and amalgam, hides, sugar, buckskin, and fine woods. Imports are: cotton goods and other tissues, firearms, provisions (dried, salted, or canned), glassware, window-glass, candles, matches, iron and steel in various forms, nails, machetes, crockery and chinaware, furniture, paints, musical instruments, agricultural implements and tools for workshops and domestic use, tanned hides, lamps, wines and liquors, and art objects. The total foreign commerce for 1904, as shown by the records of the minister of the treasury, was: exports, $3,926,000, and imports, $3,202,000. Exports to the United States in 1907 were valued at $1,028,166; imports from the United States for the same period, $1,923,111. An analysis of the foreign trade for 1904 shows percentages of exports and imports, as follows: Exports to the United States, 53.2 per cent, and imports from the United States, 52.09 per cent; to Germany, 13 per cent, and from Germany, 10 per cent; to Great Britain, 8 per cent, and from Great Britain, 20 per cent; to France, 8 per cent, and from France, 5 per cent.

Shipping, Railways, Roads, etc.—Corinto, the principal western port, has the advantage of the Pacific coast lines

of steamships, American, Chilean, British, and German. Bluefields, on the eastern coast, has regular communication with the United States by means of the vessels of New Orleans and Mobile steamship companies. The Central Division of Nicaragua's railway system was recently completed. There is now a continuous line from the port of Corinto to Granada, and several branch lines are projected. The total system in operation is 160 miles long. In 1901 an American syndicate undertook the construction of cart roads to supply communication with Matagalpa, New Segovia, and other points in the interior; a concession was also granted to a citizen of the United States for a line of railway to connect Matagalpa with the head of navigation on the Rio Grande. There are in operation about 3,150 miles of telegraph lines. The number of post-offices was 133 in 1906.

Weight, Measures, and Money.—The metric system of weights and measures is in use. The unit of value is the silver *peso*, worth $0.384 in U. S. currency. The note circulation amounted to little more than $1,000,000 in 1900.

Government.—The presidential term is 4 years; but Gen. Zelaya, who was first elected as a result of the civil war of 1893, has since that time retained office continuously. Constitutionally, the president shares authority with the legislature (a single house, consisting of 40 representatives elected for two years by universal suffrage), and the judiciary (supreme court of justice, two courts of appeals, and inferior tribunals); in practice, however, authorities that should be co-ordinate may be subordinated by an irresponsible executive. The secretaries or ministers are chiefs of the departments of Foreign Affairs and Public Instruction; War and Marine; Treasury; Public Works; and Interior, Justice, and Police.

Finances.—The revenue of the nation in 1905 amounted to $1,632,800, and expenditures to $1,342,600. The main sources of income are customs duties and the tax on liquor and tobacco; the largest expenditures are for the ministry of war and marine. The funded debt is approximately $4,585,327; in the interior the government owes 12,378,808 pesos paper.

Population, Ethnology, and Education.—The number of inhabitants, formerly given as 360,000, is now estimated at 500,000, including Indians of Mosquítia and uncivilized natives of the interior. A very large proportion are descendants of the aborigines, and there is an admixture of African blood, especially in the east, but the white element is increasing. Though the population of Nicaragua is so much greater than that of Costa Rica, it has nevertheless a smaller number of schools. Costa Rica has twice as many teachers in her schools as soldiers in her army; Nicaragua, three times as many soldiers in her army as teachers in her schools. Instruction in the higher branches is given at two universities and ten colleges.

History.—On Jan. 21, 1522, Gil Gonzalez Dâvila with

four vessels sailed westward from Panama in search of the Spice Islands. Proceeding along the Pacific coast, after many mishaps, he reached the home of an Indian chief whose name was Nicaragua, and converted him to Christianity. On the same day 9,017 natives, if we may believe the commander's assertion, accepted baptism. Nicaragua's town stood on the shore of the lake to which his name has been given. Gil Gonzalez heard from the pilots he had with him that, by way of the lake and river, there was easy communication between the 'North Sea' and the 'South Sea'; and he wrote that only '2 or 3 leagues of very level road' separated the ocean from the lake. Until 1718 the isthmus, including the province of Nicaragua, was subject to the viceroy of Peru; after that to the Spanish representative at Bogotá. New Granada (Colombia) continued to claim certain rights in the entire isthmian territory, even up to Cape Gracias á Dios. The most interesting period is that in which occurred the invasion and temporary conquest of Nicaragua by William Walker, of Nashville, Tenn., with his 56 'emigrants.' Walker became virtually dictator in 1856. His aim, disclosed to one of his associates, was to found an empire embracing Central America and Mexico (see *Bibliography*). In 1895 the short-lived 'Greater Republic of Central America' was formed by the association of Nicaragua with Salvador and Honduras. It could hardly be called a genuine union.

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NICARA'GUA, Lake (native, *Cocibolca*): sheet of fresh-water in the republic of Nicaragua, 110 m. long and 30 to 50 broad. Its elevation above the Pacific, from which it is separated by a low range of hills—at one point only 48 ft. higher than the lake itself—is little more than 100 ft. The principal rivers flowing into it are the Mayales and Malacoloja on the n., and the Frio on the s.; the only one flowing out is the San Juan (formerly *Usaguadero*), which unites it with the Caribbean Sea. Its islands are numerous, mostly in groups.

NICCOLA' PISA'NO. See Pisano.

NICCOLINI, *nĭk-ko-lē'nē*, Giovanni Batista: poet: 1785-1861; b. in the vicinity of Pisa; of a noble but impoverished family. N.'s first literary efforts were full of promise, and in 1810 he was crowned by the Crusca Academy. He was appointed sec. of the Acad. of Fine Arts, where he lectured on history and mythology. In 1805 the Grand Duke Ferdinand appointed him librarian in the Pitti Palace; but this office he resigned to escape the servility of court dependence. In 1827 appeared his

noble work, *Antonio Foscarini.* In 1844 N. published anonymously his best poem—*Arnoldo da Brescia.*

NICCOLLS, *nĭck'olz*, SAMUEL JACK, D.D. LL.D., Presbyterian clergyman: b. Greenfield Farm, Pa., 1838, Aug. 3. He graduated from Jefferson College, Washington, Pa., 1857, and afterward studied theology at the Western Theological Seminary, Pa.; was ordained to the ministry in 1860, and served his first pastorate at Chambersburg, Pa.; became chaplain of the 126th Pa. volunteers, 1863, and pastor of the Second Presby. Church, St. Louis, 1865; was moderator of the Presbyterian General Assembly, 1872, and in 1890 and 1900 was a member of the commission to revise the confession of faith; moderator of the Synod of Missouri, 1905, and is Prest. of the Board of McCormick Theological Seminary at Chicago. He has been a liberal contributor to the religious press, and to cyclopedias on religious topics, and is author of *Woman's Position in the Church,* and *The Eastern Question in Prophecy.*

NICE, a. *nīs* [OF. *nice,* slothful, dull, originally 'ignorant': F. *nice,* foolish, simple: Prov. *nesci;* Port. *nescio;* Sp. *necio,* foolish, imprudent: L. *nescĭŭs,* ignorant: comp. Gael. *nais,* modest, lovely; *neas,* noble]: foolishly particular; over-regard to trifling matters; attentive to minutiæ; sweet or very pleasant to the taste; accurate; discriminating; requiring scrupulous exactness, as a nice point; fastidious; showing great delicacy; refined; pleasing; in *OE.,* luxurious; wanton; trivial; unimportant. NICELY, ad. *nīs'lĭ,* delicately; daintily; accurately; well; cleverly; in the best manner. NICENESS, n. *nīs'nĕs,* state or quality of being nice; pleasantness to the sense; extreme delicacy; minute exactness; accuracy. NICETY, n. *nīs'ĕ-tĭ,* the quality of being nice; exactness in treatment; fastidious delicacy.

NICE, *nēs,* or NICÆA, *nī-sē'a:* formerly a city of Bithynia, in Asia Minor, on the e. shore of Lake Ascania. It was built, or rather rebuilt (for an older town had existed on its site), by Antigonus, son of Philip, B.C. 316, and received the name of Antigoneia, which Lysimachus changed to Nicæa, in honor of his wife. It is famous in ecclesiastical history for two councils held in it, the First and Seventh Ecumenical Councils.—the FIRST COUNCIL OF N., A.D. 325, was convened by Emperor Constantine, in concert, according to Rom. Cath. historians, with the Roman pontiff, to define the questions raised in the Arian controversy (see ARIUS). The supporters of Arius at first are said to have numbered more than 20: but ultimately the decree condemning him was subscribed by the whole body of the council, the number of dissentients being, according to the highest computation, only five, while the most probable account reduces it to two. The NICENE CREED (q.v.) was adopted in this council. In addition to the Arian question, the Council of N. deliberated also on the Meletian Schism, which at that time divided the church of Egypt, and the particu-

lars of which have formed a subject of recent controversy. The decree of N. appears to have been founded on a compromise, but did not effectually suppress the schism. The decree of N. on the celebration of Easter was of wider application, and met universal acceptance, the few recusants being thenceforward called Quartodecimans (q.v.). This council also enacted 20 canons of discipline. For a minute and picturesque description of this council, see Dean Stanley's *History of the Eastern Church.*—The SECOND COUNCIL OF N., called also the Seventh Ecumenical Council, was assembled under Empress Irene (787), regent during the minority of her son Constantine to reconsider the subject of Images: see IMAGE-WORSHIP. In the West, the question of the acceptation of this council was the subject of considerable controversy, arising, in great measure, from a grossly erroneous Latin translation of the acts, which for a time obtained extensive circulation.

NICE, *nēs* (Ital. *Nizza*): chief town, since 1860, of the dept. of the Alpes Maritimes, France; on both sides of the river Paglione, 100 m. s.s.w. of Turin, and about the same distance e.n.e. of Marseilles. Pop. (1891) 88,273; (1901) 105,109. It consists of three principal parts—the *Quartier de la Croix de Marbre*, or *New Town* (on the right bank of the Paglione), the *Old Town*, and the *Port*. The first of these is frequented by foreigners, particularly English (whence its name 'English town'). It is close to the river; has a handsome quay filled with gay shops, and a splendid square called the Jardin Public. Two bridges over the Paglione connect it with the Old or Upper Town, which extends back to the foot of a hill called the Castle Hill. The Old Town is excessively dirty, and has narrow, reeking streets, with macaroni and confectionery shops, grocery establishments, slaughter-houses, etc. The Port, almost separated from it by the Castle Hill, is crowded with a seafaring population. The harbor admits vessels drawing 15 ft. of water, but is difficult of entrance. The Castle Hill, an isolated mass of limestone 800 ft. high, formerly crowned by a strong castle now in ruins, is laid out in public gardens, and affords an extensive and splendid prospect seaward. The chief public buildings are in the Corso, or in the adjoining streets, in one of which is an English library and reading-room. There is an Episc. and a Presb. church in N., and an English cemetery. The most attractive promenade in the Old Town is the *Terrace*, 15 to 20 ft. high, erected as protection to the town against a stormy sea. But the most agreeable and fashionable drive and promenade is the *Promenade des Anglais*, extending a mile along the shore from the right bank of the Paglione, and skirted on one side by elegant villas and hotels. Beggars are numerous, owing, doubtless, to the great influx of visitors, from all parts of the world, during winter. N. is sheltered toward the n. by hills that rise in stages back to the Alps. The mercury seldom falls below freezing, and snow is practically un-

known. Rain is plentiful, but usually falls rapidly and heavily, leaving the skies soon clear again. Autumn is the pleasantest season, with fewest undesirable changes of weather. The climate of N. has for 2,000 years been reputed favorable to pulmonary troubles; but to heart-disease or nervous disorders it is the reverse of beneficial. Fine as the usual winter and spring weather of N. is, it is exposed to the n. wind, or *Tramontane*, or to the n.w. wind, or *Mistral*, which, during these seasons, sometimes bring a temperature which in England would be considered cool, or even cold, in Apr. or Oct.: these winds bring intolerable dust-storms; but, fortunately, the mountains usually stop them. The *Quartier Carabacel* is the most sheltered part of the place, therefore the best for an invalid. Dust and bad drainage are the drawbacks to the pleasantness of N.; but this is true with regard to most of the places of winter resort in the south. The mean Jan. and Feb. temperature is 47°, equal to that of Apr. in England; March is 52°; April 58°, about the same as June in England, or July in Scotland.

The ancient Ligurian town of Nicæa, founded, it is said, by a colony of Phocæans from Massalia (Marseille), became subject to Rome B.C. 2d c. It probably occupied the Castle Hill, rather than the site of the present city. Subsequently it passed into the hands of the Goths, Burgundians, Visigoths, kings and counts of Arles, the Angevine sovereigns of Naples, and the dukes of Savoy (1388), in whose family it remained till 1860, when it was ceded to France.

NICENE, a. *nī-sēn′:* pert. to the town of *Nice* or *Nicæa*, in Asia Minor: denoting a celebrated council held there, A.D. 325. NICENE CREED, summary of Christian faith drawn up by the Council of Nice, with the additions made at the Council of Constantinople 381: a detailed statement of doctrine, which forms part of the liturgy of the Roman, Oriental, and Anglican churches, and is also received as a formulary by some other Protestant communions. It was drawn up principally by Hosius of Corduba, and is called by the name of the Council of Nice, though nearly one-half of its present clauses formed no part of the original Nicene formulary; while, on the other hand, that document contained a series of anathemas condemnatory of specific statements of Arius, which find no place in the present so-called Nicene creed. (See CREEDS AND CONFESSIONS: also COUNCIL, or SYNOD.) The distinctive characteristic of the creed drawn up in the council was the word *Homoousios*. (See HOMOIOUSIAN.) Its clauses correspond (except in a few verbal details) with those of the modern formulary, as far as the words, 'I believe in the Holy Ghost;' after which follow the anathemas referred to above. The remaining clauses of the present creed, though they seem to have been in public use earlier, were formally added in the First Council of Constantinople (381), with the excep-

tion of the clause, 'And from the Son,' which was introduced in various churches of the West in the 5th and 6th c.; and ultimately its formal embodiment in the creed has continued a subject of controversy with the Greeks to the present day: see GREEK CHURCH. This creed appears to have been used in the public liturgy from the latter part of the 5th c. Its position in the liturgy varies in the different rites. In the Roman liturgy it is read on all Sundays, feasts of our Lord, of the Virgin Mary, apostles' days, and all the principal festivals, but not on week-days or the minor saints' days.

Several Arian creeds, in opposition to that of Nice, were drawn up at Sirmium and elsewhere (see LIBERIUS), but none of them met general acceptance.

NICHE, n. *nĭch* [F. *niche*—from. It. *niechia*, a recess in a wall for a statue]: cavity or recess in a wall, as for a statue, bust, or ornamental figure. In classic architecture, niches are generally square recesses, with canopies formed by small pediments. In Gothic architecture, the niche is one of the most frequent and characteristic features; the doorways, buttresses, and every part of the buildings being in many instances ornamented with niches and statues in endless variety. NICHED, a. *nĭcht*, having a niche, or put into one.

NICHIREN: religious leader: b. Kominato, province Awa, Japan, about 1222. He was versed in various languages, gave many years to the study of the writings of early followers of Buddha, and became the founder of a large and powerful sect of Buddhists in Japan. He travelled from place to place, preaching, establishing societies, and building temples. Incurring the displeasure of the govt., he was sent into exile at various times; but he soon returned, and his zeal never abated. He led the great revival of Buddhism which in the 13th c. swept over the empire, and wrote several religious books, some of which are still valued. Every year, thousands of pilgrims, rich and poor together, visit Ikegami, where he died. Though his followers do not hold the highest form of doctrine, they are the most active and intelligent of the present sects of Buddhists in Japan.

NICHOL, *nĭk'ol*, JOHN, LL.D.: 1833, Sep. 8—1894, Oct. 11; b. Montrose, Scot.; son of John P. N., LL.D. He graduated from the Univ. of Glasgow 1855, and four years later from Oxford. In 1861 he returned to Glasgow as prof. of Eng. literature. He was a very successful teacher, and gave lectures in the principal cities of Scotland and England. During the civil war in this country, he was an outspoken friend of the Union cause. In theology, he belongs to the 'Broad Church' party. Besides his contributions to the leading reviews, he has written several books, among which are: *Hannibal*, a drama; *Tables of European Literature and History; Tables of Ancient Literature and History; The Death of Themisto-*

cles, and Other Poems; and numerous articles in the *Encyclopædia Britannica*, 9th ed., of which one, on *American Literature*, has been issued separately.—His father, JOHN PRINGLE N., LL.D. (1804, Jan. 13—1859, Sep. 19), b. Scotland, studied theology, became prof. of astronomy in the Univ. of Glasgow, and a noted lecturer on astronomical subjects. He wrote *Cyclopædia of the Physical Sciences*, and other books.

NICHOLAS, *nĭk'o-las*, I., Pope of Rome: d. 867, Nov. 13 (pope 858–867); of a noble Roman family: one of the powerful and commanding figures in the pontifical line. On the death of Benedict III., N. was elected to succeed him, and was consecrated in St. Peter's Church, in the presence of Ludwig II., Emperor of Germany. The earliest noticeable incident of his pontificate is his conflict with Photius (q.v.), who had been intruded into the see of Constantinople after the unjust deprivation of Ignatius. N. demanded from the emperor the restoration of Ignatius, as well as the withdrawal of certain attempted invasions of the jurisdiction of the West. On the refusal of his demands, N. excommunicated Photius (see GREEK CHURCH); and that patriarch, in return, assembled a council at Constantinople, and, retorting upon his rival the same sentence, alleged that, with the translation of the seat of civil sovereignty from Rome to Constantinople, the ecclesiastical supremacy likewise was transferred. Emperor Michael supporting Photius in his claim, N. failed to command submission to his sentence; nor was it till the following reign (that of Basil, the Macedonian) that Photius was deposed, and Ignatius restored to his see. Meanwhile, however, N. had been embroiled with Emperor Ludwig. The pope had been appealed to by the unjustly divorced wife of Ludwig's younger brother, Lothaire, King of Lorraine, and had appointed legates to inquire into and report upon the case; and the legates having exceeded their powers and violated the truth by giving a sentence in favor of Lothaire, who wished to discard his wife and marry his mistress, the pope declared their sentence null, and excommunicated the two abps. who had been active in securing the evil sentence and had audaciously brought it to Rome. Ludwig espoused their cause, and marched his troops to Rome, in order to enforce satisfaction. After some hostile demonstrations, the emperor, terrified, it is said, by his own sudden illness, and some fatalities which befell his followers, desisted from the enterprise, and withdrew his troops, having obtained from N. no concession. The pope thus maintained the right, in the face of a letter of confession to him from the rejected wife herself, urging Lothaire's claim. N. disallowed this, as plainly extorted by force and fraud; and only his death saved Lothaire from being utterly humiliated.

NICH'OLAS V. (Tommaso Parentucelli, *tom-mâ'zo pâ-rĕn-tô-chĕl'lē*), Pope of Rome: 1389–1455, Mar. 24 (pope 1447–55); b. Sarzana, near Spezzia; son of a physician. He was educated at Florence and Bologna, and, having fixed his residence in Bologna, he was eventually named bp. of that see by Pope Eugenius IV. During the troubled period of the Councils of Basel and Florence, and in the difficult negotiations with the German and other churches which arose therefrom, he conducted himself with such ability and prudence that on the death of Eugenius IV. he was chosen to succeed him, 1447, Mar. 6. At this time, the antipope, Felix V., still maintained himself, though supported by a very small party; but N. prevailed on him to abdicate, and thus restored the peace of the church, 1449. In the judgment of the literary world, however, the great distinction of the pontificate of N. is in the eminent service which he rendered to that revival of letters which dates from his age. The comparative repose in which he found the world at his accession enabled him to employ, for discovery and collection of the scattered masterpieces of ancient learning, measures beyond the resources of his predecessors. He dispatched agents to all the great centres, both of the East and of the West, to purchase or to copy every important Greek and Latin manuscript. The number collected by him was above 5,000. He enlarged and improved the Roman university. He remodelled, and may be said almost to have founded, the Vatican Library. He caused translations to be made into Latin of most of the important Greek classics, sacred and profane. He invited to Rome the most eminent scholars of the world, and extended his especial patronage to those Greeks whom the troubles of their native country drove to seek a new home in the West. Alarmed by the progress of the Turkish arms in Asia, he endeavored to arouse the Christian princes of Europe to the duty of succoring their brethren of the East; but the age of enthusiasm was past, and he was forced to look on inactively at the fall of Constantinople 1453. This event, by forcing a large number of learned Greeks to repair to Italy and other countries of the West, contributed powerfully to that progress of learning which N. had deeply at heart; but he scarcely lived to enjoy this result, having died two years later, at the comparatively early age of 57.—He must not be confounded with an antipope of the same name, Peter de Corbario, who was set up 1328, by Ludwig of Bavaria, in antagonism to John XXII. (q.v.). See Nicolas, St.

NICH'OLAS I. (properly Nikolai Paulovitch, *nē-ko-lâ'ē* or *nē-ko-lī' pâv'lo-vĭch*). Emperor of Russia: 1796, June 25—1855, Feb. 18 (reigned 1825–55); b. St. Petersburg; third son of Paul I. He was very carefully educated under the eye of his mother, a pious but not broad-minded princess of Würtemberg; and subsequently applied himself to military studies and political economy, without, however, giving evidence of any nat-

ural capacity for these subjects. He visited England and other European countries 1816, and made a tour through the Russian provinces. 1817, July 13, he married Frederika-Louisa-Charlotte-Wilhelmina, eldest daughter of Frederick William III. of Prussia, and lived in domestic retirement till the death of Alexander I. (1825, Dec.), when, having awaited the formal resignation of his elder brother Constantine (who was unfit to govern the empire, and was aware of it), N. succeeded to the throne of Russia. A long-prepared military conspiracy broke out immediately after his accession, which he, under sincere but ill-controlled alarm, suppressed with great vigor and cruelty. Capital punishment, which had been abolished by Empress Elizabeth, was revived, for infliction on the leaders of the insurrection. The rebels were hunted down with merciless energy, and in no case, even after the rebellion ceased to be in the least degree dangerous, was their punishment commuted. Instead of pursuing the course on which Alexander had entered—cultivating the mind of the nation, so as to base his government on education and intelligence—N., after a brief ebullition of reformatory zeal, reverted to the ancient policy of the czars—absolute despotism, supported by mere military power. His first great measure, the codification of Russian law, was commenced 1827, completed 1846.

Soon after his accession, a war with Persia commenced, but it was ended 1828, Feb. 28, by the peace of Turkmanshai, which gave considerable territory to Russia. In the same year he entered on a war with Turkey, in which victory, though at enormous cost, constantly attended his arms; and the peace of Adrianople (q.v.) obtained for Russia another increase of territory, the free navigation of the Danube, with the right of free passage between the Black and Mediterranean seas. The political movements of 1830, in w. Europe, were followed by a national rising of the Poles, which was suppressed after a desolating contest of nine months, in which the utmost efforts of all the military resources of Russia were required. N. punished the rebellion by converting the kingdom of Poland into a mere Russian province, and strove to extinguish the Polish nationality. This policy, however, was viewed with great dissatisfaction throughout Europe, and the vanquished Poles were everywhere regarded with general sympathy. Russia, by N.'s mode of government, became more and more separated from the fellowship of the western nations. Intellectual activity was, as far as possible, restrained to things merely practical, education limited to preparation for the public service, the press was placed under strictest censorship, and all means were used to bring the whole mind of the nation under official guidance. His Panslavism (q.v.) also prompted him to Russianize as much as possible all inhabitants of the empire, and to convert Rom. Catholics and Protestants to the Russian Greek Church, of which the czar is the head. The independ-

ence of the mountaineers of the Caucasus was inconsistent with his schemes, and war was consequently waged against them with the greatest energy and perseverance, though with little success, and at cost of immense sacrifices of money and lives. The extension of British influence in central Asia was viewed by him with alarm, and he attempted to counteract it by various means, among which was the expedition for the conquest of Khiva, 1839, which failed so signally (see KHIVA). 1844–46, he visited England, Austria, and Italy. During the political storm of 1848–9, he abstained from interference, watching, however, for an opportunity of doing so with advantage to Russian interests. The opportunity was at last found in the request of the emperor of Austria for his assistance to quell the Hungarian insurrection. This good service rendered Austria, as he thought, a faithful and firm ally. He succeeded at the same time in drawing closer the bonds of alliance between the Russian and Prussian monarchies—a proceeding fraught with the most mischievous consequences to the latter power. The re-establishment of the French empire still further tended to confirm these alliances, and led N. to think that the time had at length come for carrying into effect the hereditary Russian scheme for absorption of Turkey; but the unexpected opposition of Britain and France, and his own invincible repugnance to give up his long-planned scheme of conquest, brought on the Crimean war, during which he died at St. Petersburg, of atrophy of the lungs; but his death was undoubtedly hastened by chagrin at the repeated defeats which his arms sustained, and by overanxiety and excessive labor to repair his losses. He was remarkable for temperance, frugality, and patriotism, but equally for vanity and ostentation. He was fanatically beloved by his Russian subjects, and was at the same time regarded by them with awe—a tribute to his lofty stature and imperial deportment, which gave him most intense pleasure. This extreme vanity seems, to some extent, to have affected his mind, and to have been partly the cause of his political blundering.

NICH'OLAS II. (ALEXANDROVITCH): Czar of Russia: 1868, May 18— ——— ———; b. St. Petersburg. His father was Czar Alexander III., and his mother a daughter of the King of Denmark. He succeeded to the throne 1894, Nov. 1, immediately on the death of his father, and was formally crowned at Moscow 1896, May 26. He was married 1894, Nov. 26, to Princess Alix of Hesse-Darmstadt. The marriage was hastened in accordance with the last wishes of Alexander III., the betrothal having been announced by the Emperor of Germany. N. II. is by blood the nephew of the Prince of Wales and first cousin of the Duke of York, while his father's sister is the wife of another British prince, the Duke of Coburg, formerly known as the Duke of Edinburgh, son of Queen Victoria. His wife is a grand-daughter of Queen Victoria, being a daughter of the late Princess Alice of England. The coronation ceremonies at Moscow were attended by representatives of nearly every nation of the earth, and soon thereafter the czar and czarina visited the principal courts and nations of Europe. The early education of N. II., conducted under Gen. Danilovitch, gave him an extensive knowledge of modern languages and history and a fair acquaintance with science. He is familiar with the literature of France and England. Of classics he was taught nothing beyond the rudiments, but in civil law and finance he had thorough grounding. In 1886 he entered an infantry regt. of the guard and served in various capacities, becoming a useful and popular officer. During the great famine 1891–2 he was pres. of the famine-relief commission; he was also pres. of the imperial commission for construction of the Trans-Siberian railway. In 1891, with Prince George of Greece as a companion, he started on a trip around the world. At Otsu, Japan, he was attacked by an infuriated Japanese policeman, but by Prince George, who overcame the assailant, N. was saved from being seriously wounded. The projected trip of the czarawitz was then abandoned by order of the czar. The czarowitz then proceeded by road to cross Siberia to St. Petersburg, a journey of about 5,000 m. In 1893 he was present at the wedding of the Duke and Duchess of York. In Aug. of the year of his coronation, 1896, he made a tour which included visits to the Emperors of Austria and Germany, to the King of Denmark, to Queen Victoria, and to the President of France. The last accentuated the alliance between Russia and France, which was definitely announced on the occasion of the return visit of Pres. Faure to St. Petersburg, 1897. N. II. originated the Hague Peace Conference, but his imperial policy precipitated the Russo-Japanese War, 1904-05, and the subsequent internal troubles of Russia. The Czar and Czarina have four daughters and a son, the Grand Duke Alexis, heir-apparent, b. 1904, Aug. 12.

NICH'OLAS I., Prince of Montenegro: born 1841. He received a good preparatory education, and graduated from the military acad. at Paris when less than 20 years of age. On the assassination of his uncle, Prince Danilo, 1860, N. succeeded the throne. He travelled in various European countries, and on his return reorganized the army and introduced improvements in educational and political affairs. By the Berlin treaty 1878, Montenegro, which had been a dependency of Turkey, became an independent province, with a considerably enlarged area. Though a council is supposed to share in the govt., the rule of the prince is practically absolute. Throughout most of his career, he has ruled wisely, and has shown much skill in his intercourse with foreign powers. The great blot upon his fame is the massacre of the inhabitants of Gusinje, which was pillaged by his soldiers 1879.

NICH'OLAS, George: statesman: 1755–99; b. Hanover, Va.; son of Robert Carter N. He graduated at William and Mary 1772; was maj. of the 2d Va. regt. 1777, and afterward col. He was an active member of the convention which ratified the federal constitution, and an influential member of the house of delegates. Removing to Ky. 1790, he was chosen a member of the convention which framed the state constitution at Danville 1792, Apr. 1. The constitution was largely his work. He was the first atty.gen. of Ky.

NICH'OLAS, Saint; or Santa Claus: see Nicolas, Saint.

NICH'OLAS, Wilson Cary: 1757–1820, Oct. 10; b. Hanover, Va.; son of Robert Carter N. He graduated at William and Mary College. He was an officer in the revolutionary army, and commanded Washington's lifeguard until its disbandment 1783. He was a member of the convention which ratified the federal constitution, and represented the democratic party in the U. S. senate from 1800, Jan. 3, until his resignation 1804, Dec. 17. He was collector of the ports of Norfolk and Portsmouth in 1804–07; and was elected, 1814, gov. of Va.

NICHOLS, *nik'olz*, Edward Tatnall: naval officer: 1823, Mar. 1—1886, Oct. 12; b. Augusta, Ga. He was appointed to the U. S. Naval Academy 1836, and became passed midshipman 1842, lieut. 1850, commander 1862, capt. 1866, commodore 1872, rear-adm. 1878, and was placed on the retired list 1885. He held command of the U. S. steamer *Winona* at the beginning of the civil war, and took part in the bombardment of Forts Jackson and St. Philip, the latter surrendering to him 1862, Apr. 28. In the passage of the batteries at Vicksburg, he was commended for ability, steadiness, and sound judgment. While commanding the U. S. steamer *Mendota*, 1864, June, he engaged the Confederate battery at Four Mile Creek, James river, Va.

NICH'OLS, WILLIAM AUGUSTUS: 1818, May 12—1869, Apr. 8; b. Philadelphia. He graduated from West Point Milit. Acad. 1838, received various promotions, in the Mexican war was brevetted major for brilliant service at Molino del Rey, became capt. 1852, and lieut.col. 1861. In the civil war, he served as adjt.gen. of various depts., and asst. of the adjt.gen. at Washington 1862–64; was promoted col. and brevetted brig.gen. 1864, and maj.gen. the following year. He was appointed adjt.gen. of the dept. of Mo., and held this office till his death, which occurred at St. Louis.

NICHOLSON, *nĭk'ol-son*, Sir FRANCIS: born England; d. 1728, Mar. 5. After serving as lieut.gov. of N. Y. under Andros, he became gov. 1687, and held the office two years; was gov of Va. 1690–92, of Md. 1694–99; and in the latter year again became gov. of Va., holding the appointment six years. He commanded the expeditions to Nova Scotia 1710 and to Canada 1711; was gov. of Nova Scotia five years from 1712, and of S. C. 1721–25. He was knighted 1720, and promoted lieut.gen. 1725. He died in London.

NICH'OLSON, JAMES: 1737–1804, Sep. 2; b. Chestertown, Md. His father was an officer under the British govt., and received a grant of land in Va. Young N. became a sailor, was present at the bombardment of Havana 1762, and lived in New York 1763–71. At the opening of the revolution, he joined the American navy; was capt. of the *Defence* 1775, with which he seized several vessels which the British had captured. He was placed in command of the *Virginia* 1776, and the following year became commander-in-chief of the navy. His ship being blockaded in the Chesapeake Bay, he joined the land forces with his crew, and fought at the battle of Trenton. In attempting to reach the sea, his ship was stranded, and was seized by the British; but N. and nearly all his force escaped. While in command of the *Trumbull* 1780, he fought a desperate but indecisive battle with the *Wyatt*. The following year he was taken prisoner by the British, and was held captive till about the close of the war. He returned to New York, where he was commissioner of loans for the govt. from 1801 till his death.

NICH'OLSON, JAMES WILLIAM AUGUSTUS: 1821, Mar 10—1887, Oct. 28; b. Dedham, Mass.; son of Nathaniel D. N., and grandson of Samuel N. At the age of 17 he became a midshipman in the U. S. navy, was acting master of a vessel in the war with Mexico, was an officer of the *Vandalia* in Com. M. C. Perry's expedition to Japan, and 1857–60 assisted in the suppression of the slave trade on the African coast. In the beginning of the civil war, he commanded the *Isaac Smith* at the Port Royal expedition, and received honorable mention from Admiral Dupont for courage and skill. He was stationed at St. Augustine, Fla., 1862; was in the blockading squadron at Charleston, and with Farragut at the battle of Mobile Bay. He commanded a steamer in the Pacific 1865–6.

and the flag-ship of the Brazil squadron 1871–2. For four years from 1876, he was in charge of the navy-yard at Brooklyn, was in command of the European station 1881–83, and protected the U. S. consul and American residents at the British bombardment of Alexandria, Egypt, 1882. He was promoted lieut. 1852, commander 1862, capt. 1866, commodore 1873, rear-admiral 1881, and was retired 1883. Several European govts. presented him with medals and decorations. He died at New York.

NICH'OLSON, JOHN: British general: 1821, Dec. 11—1857, Sep. 23; b. Dublin; son of a physician of considerable reputation in that city, who died when the boy had completed his 8th year. By his mother, a woman of strong sense and much practical piety, he was carefully educated. From his mother he seems to have imbibed a certain religious earnestness which was noted in him through life. At the age of 16 he arrived in Calcutta as an Indian cadet; and 1840 his regt. was ordered to Ghizni in Afghanistan, where, two years later, it was captured in the insurrection. N. regained his liberty, joined the relieving army, and later was stationed at Meerut, doing duty as adjt. of his regiment. After serving in the Sikh war of 1845, N., now a lieut., was appointed asst. to the resident at the conquered capital, Lahore, and thus transferred to the political branch of the service, in which most of his remaining years were passed; though during the Sikh rebellion of 1848 he greatly distinguished himself for daring and promptitude.

With short intermission for a visit to his aged and widowed mother, N. served several years as dep.-commissioner in the Punjab—mostly among the savage tribes of the frontier. His success in introducing law and order was marvellous; and the fear and reverence wrought by the force and massive personality of the man made him the object of a curious kind of hero-worship. So far was this carried, that a sect actually arose (Nikkul-Seynees) who consecrated N. as their Guru (or spiritual guide), and persisted—despite severe floggings regularly inflicted by the worthy man—in falling at his feet, and making him an object of divine honors.

The great mutiny 1857 brought N.'s great opportunity, and opened the brief career of glorious achievements in which he developed, in the eye of the world, the fulness of his military genius. In the saving of the Punjab, virtually India was saved to Britain; and, under Sir John Lawrence, N. perhaps did more than any other one man to hold the Punjab. He suggested and largely organized the famous movable column, by which mainly the work was done, and was appointed to command it; and, in his dealings with the suspected regiments of Sepoys, he showed a fine combination of boldness, subtlety, discretion, and astuteness. At Trimmu Ghaut, July 12 and 14, he brought to bay, and nearly annihilated, a large force of the declared rebels. Marching to reënforce Gen. Wilson, in the siege of Delhi, he arrived Aug. 7, and, with fiery and impatient energy, expedited the delayed

assault. After brilliant service in preliminary engagements, Gen. N. (for to this rank he had now attained) was selected for the post of honor in the final assault, and on the morning of Sep. 14 he led the first column of attack. After the troops had forced their way into the city, an unforeseen check occurred, and N., ever in front, exposed himself in the most fearless manner, to animate his men to advance. Conspicuous by his towering stature, he became the mark of the enemy's bullets, and fell, shot through the body. He lingered some days in great suffering, and died on the morning of the 23d. The joy of victory was clouded by his death; for it was felt that in John N., to use Lord Canning's expression, 'a tower of strength' had fallen. All who came fairly in contact with him were strangely impressed with the sense of a magnificent reserve of *power* in him. His nature was on one side as tender and affectionate as on the other it was strong and brave. The E. India Company voted a special grant of £500 a year to the mother who survived him.—See Kaye's *Lives of Indian Officers* (2 vols. Lond. 1867).

NICH'OLSON, JOHN B.: naval officer: 1783–1846, Nov. 9; b. Richmond, Va. He became midshipman U. S. N. 1800, July 4; lieut. 1812, May 20; commander 1817, Mar. 5; capt. 1828, Apr. 24; he afterward ranked as commodore. While serving as 4th lieut. of the *United States*, he assisted in the capture of the *Macedonian*. As 1st lieut. of the *Peacock*, at the time of her engagement with the *Epervier*, he brought the prize-ship into port. He was on terms of intimacy with Washington Irving, whose letters speak of him as 'Jovial Jack Nicholson.' He died at Washington, D. C.

NICH'OLSON, SAMUEL: 1743–1811, Dec. 29; b. Chestertown, Md.; bro. of James N. He was the first commander of the frigate *Constitution;* was lieut., with Paul Jones, on the *Bon Homme Richard*, at the time of her engagement with the *Serapis;* became capt. 1779, Sep. 17; on reorganization of the navy, was commissioned capt. 1794, June 10; was senior officer U. S. N. at his death. While cruising in command of the frigate *Deane*, 32 guns, 1782, he captured 3 British sloops of war and several other prizes. He died at Charlestown, Mass.

NICH'OLSON, WILLIAM CARMICHAEL: 1800–1872, July 25; b. Md. When only 12 years of age, he received a commission as midshipman in the U. S. navy; and when the *President* surrendered in the battle off Long Island, 1815, Jan., he was captured by the British. He was taken to England and held prisoner till the close of the war. He was in the Pacific squadron 1827, the Mediterranean squadron 1843, and was afterward at Boston, New York, and Memphis. In the E. India squadron, 1858–61, he commanded the *Mississippi*. In the latter year he was placed in command of the *Roanoke*, and had charge of the govt. marine asylum in Philadelphia. He was assigned to special duty during the civil war. He was promoted lieut. 1821, commander 1841, capt. 1855, commodore 1862. He died in Philadelphia.

NICH'OLSON, William Rufus, D.D.: bishop of the Ref. Episc. Ch.: b. Greene co., Miss., 1822, Jan. 8; d. 1901. He graduated at Lagrange College, Ala., 1840; and after admission to holy orders in the Prot. Episc. Church, became successively rector of prominent churches in New Orleans, Cincinnati, Boston, and Newark, N. J. He joined the Ref. Episc. Church in 1874, and took charge of a church in Philadelphia. He was consecrated bishop in 1876, and afterward chosen dean of the theol. seminary of the Ref. Episc. Church in Philadelphia.

NICIAS, *nĭsh'ĭ-as:* famous Athenian statesman and general during the Peloponnesian war: d. B.C. 414; son of Niceratus, a very wealthy citizen, who had acquired his fortune by working the silver mines at Laurium. Nicias belonged to the aristocratic party, and, after the death of Pericles, presented himself as the opponent of Cleon, the great popular or demagogic leader. Nicias was not a man of quick, brilliant, audacious genius, like Alcibiades; on the contrary, he was remarkably wary and cautious, even to timidity. Success generally accompanied his enterprises against the Spartans and their allies. B.C. 427 he captured the island of Minoa; next year, he ravaged the island of Melos and the coasts of Locris; the year following, he compelled the Spartan force in Sphacteria to surrender, and defeated the Corinthians. B.C. 424 he made havoc of part of Laconia, captured the island of Cythera, and achieved other successes. After the death of Cleon, he brought about a peace between the Spartans and Athenians, B.C. 421. Six years afterward, the Athenians, at the instigation of Alcibiades, resolved on a great naval expedition against Sicily. Nicias was appointed one of the commanders, though he had strongly protested against the undertaking. B.C. 415, in autumn, he laid siege to Syracuse, and was at first successful, but subsequently experienced a series of disasters; his fleet was destroyed, and his troops began a retreat toward the interior of Sicily. They were speedily forced to surrender, and Nicias was put to death. See Thirlwall's and Grote's Histories of Greece, and Plutarch's *Life of Nicias.*

NICK, n. *nĭk* [It. *nicchia,* a nick]: a cut or notch: V. to cut in nicks or notches; to notch. Nick'ing, imp. Nicked, pp. *nĭkt.*

NICK, n. *nĭk* [F. *nique,* a trick, hence a sleight or turn of hand: Ger. *nicken,* to nod, to wink]: the exact point or critical moment; a fortunate conjuncture; the winning throw or trick: V. to hit; to touch luckily; to perform, by a slight artifice used at the lucky moment; to cozen; to defeat. Nick'ing, imp. Nicked, pp. *nĭkt.* Nick of time, just as the notch was being cut in the tally; just in time; at the required moment. In the nick, exactly. *Note.*—The origin of this sense of *nick* has also been assigned to the *nicking* or *notching* of tallies, or the *checking* of the names of students entering a classroom.

NICK, n. *nĭk*, or OLD NICK [Low Ger. *nikker*, the hangman, the devil, as, in the popular estimation, the great executioner prepared for the condemned at the day of judgment: Icel. *nikr*; AS. *nicor*, a water-god]: the devil.

NICKEL, n. *nĭk′ĕl* [Ger. *nickel*, a contraction for *kupfernickel*, false copper—that is, copper of *Nick* or *Nicholas*, name given to it by the miners, in derision, from their deeming it base ore of copper: Ger. *kupfer*, copper]: elementary body in the form of a metal of white or reddish-white color, and of great hardness; is ductile and malleable, and, like iron, is attracted by the magnet, and may be rendered magnetic. NICKELIC, a. *nĭk′ĕl-ĭk*, pert. to nickel. NICKELINE, n. *nĭk′ĕl-ĭn*, one of the chief ores of nickel. NICKEL-GLANCE, a grayish-white ore of nickel. NICKEL-OCHRE, or NICKEL-GREEN, an arseniate of nickel of apple-green color. NICKEL-SILVER, white metal or German silver, a compound of tin and nickel.

NICK′EL (symbol, Ni; equiv. 58·8—sp. gr. 8·8): grayish-white glistening metal capable of high polish, of about the same hardness as iron, and, like iron, malleable and ductile. It has about the same fusibility as wrought iron, but is less readily oxidized than that metal, since it remains unchanged for a long time in a moist atmosphere, and is very little attacked by dilute acids. It is strongly magnetic, but loses this property when heated to 660° F. It dissolves in hydrochloric and dilute sulphuric acid with a development of hydrogen gas, and is very readily oxidized in nitric acid. In 1889 N. (also Cobalt) was reported to have been decomposed by Dr Kruss of Munich.

N. occurs in the native state only in meteoric stones, in which it is generally present in association with the iron which forms the principal part of many of those masses. It is abundant in Saxony, Westphalia, Hungary, Sweden, etc., in the form of *kupfernickel* (so called from its yellowish-red color), a combination of N. and arsenic. The metal is obtained on the large scale (for making German Silver [q.v.] and other alloys, and for anodes for electro-plating) either from this compound or *speiss*, which is an impure arsenio-sulphide of N., formed during the manufacture of *Smalt* (q.v.), by complicated chemical processes. In small quantities, it may be obtained by reducing one of its oxides by means of hydrogen at a high temperature, or by exposing the oxalate to a high temperature in a crucible lined with charcoal.

N. forms two compounds with oxygen—viz., a protoxide, NiO; and a sesquioxide, Ni_2O_3, which is not basic, and may be passed without further notice. The *protoxide* occurs as greenish-gray powder, which exhibits no magnetic properties, and is insoluble in water: it is obtained by heating the carbonate or the *hydrated protoxide* in a closed crucible. The hydrated protoxide, NiH_2O_2, is obtained by precipitation from a solution of one of its salts by potash. The salts of the protoxide and their solutions are of a delicate, very characteristic green color; but

in the anhydrous state most of them are yellow. The neutral salts, soluble in water, slightly redden litmus, have a sweetish astringent metallic taste, and, when administered in moderate doses, excite vomiting. The most important of the salts is the sulphate, $NiSO_4,7H_2O$, which crystallizes in beautiful green rhombic prisms. It is obtained by dissolving the metal or its oxide in dilute sulphuric acid; and is the source from which the other salts of N., the carbonate, oxalate, etc., are obtained. The principal use of N. has been in the composition of various alloys, such as German Silver (q.v.), and in electroplating on an immense scale. In 1880 a process was perfected by Fleitmann for producing large pieces of nickel in malleable form, previously impossible. N. has been used for coins of small value: 1857 a U. S. cent was coined—88 per cent. copper, 12 nickel. The recent application of N. for plating other metals has brought it into great demand. the process which has made it profitable was devised by Isaac Adams of Boston, and involves the use of a double chloride of N. and ammonium, or of sulphate of N. and ammonium: see GALVANISM (*Electrolysis, Electro-metallurgy*)

NICKER, v. *nĭk'ẽr:* in *Scot.* in a game of marbles, to propel a small bowl or marble along the ground, by means of the joint action of the forefinger and thumb, toward other marbles placed at a little distance, with the view of striking one or more of them: N. in *Eng. slang*, one who nicks or hits a mark exactly.

NICK-NACK, n. *nĭk-năk:* a spelling of KNICK-KNACK, which see under KNACK.

NICKNAME, n. *nĭk'nām* [Icel. *auknefni;* Sw. *öknamn;* Ger. *eichname*, a surname, a nickname—from Icel. *auk;* OE. *eke*, in addition, besides, and Eng. *name;* F. *nom de nique*, a name of contempt]: a term of reproach, contempt, or derision; a by-name: V. to call by an opprobrious name. NICK'NAMING, imp. NICKNAMED, pp. *nĭk'nāmd*, named in derision or reproach.

NICOBAR, *nĭk-ō-bâr'*, IS'LANDS: group of 20 islands (8 large, 12 small) in the Indian Ocean, n.w. of Sumatra; forming, with the Andamans (q.v.), an extension of the great island chain of which Java and Sumatra are principal links; lat. 6° 40′—9° 20′ n., long. 93°—94° e. They are divided by the Sombrero Channel into two groups, of which the principal members are the Great N. (about 260 sq. m.) and the Little N. (86 sq. m.). The largest island, Great Nicobar, is about 30 m. long, 12 to 15 m. wide. The inhabitants, not numerous, are distinct from Malays and Burmese, and are a savage race, said to resemble the hill-tribes in Formosa. The Danes made a settlement here 1754, were dispossessed by Great Britain 1807–14, and finally withdrew 1848. In 1869 the Indian govt. took possession of these islands, after inquiry into charges of piracy and murder against their inhabitants, and affiliated the new settlement at Nancowry Harbor to the great penal colony at Port Blair in the Andaman Islands. The soil is fertile.

NICOLAI, *né ko-lī*, CHRISTOPH FRIEDRICH: German author, bookseller, and publisher: 1733, Mar. 18—1811, Jan. 8; b. Berlin, where his father also was a bookseller. He applied himself to literary and philosophical studies, and early won repute by *Briefe über den jetzigen Zustand der schönen Wissenschaften* (Berl. 1756), in which he exposed the errors of both Gottsched and Bodmer, then in a controversy agitating the literary world of Germany. N. became associate of Lessing and Moses Mendelssohn. Jointly with the latter, he edited the admirable *Bibliothek der schönen Wissenschaften* (Leip. 1757–8); and, with Lessing, he gave to the world *Briefe, die neueste deutsche Literatur betreffend* (24 vols. Berl. 1759–65). By this he was led to conceive the plan of the *Allgemeine deutsche Bibliothek* (106 vols. 1765–92), a periodical which he edited many years, and which contributed much, particularly in the early period of its existence, to the improvement of literary taste in Germany, though too frequently characterized by an undue acerbity of tone. N.'s hostility to the new schools of literature and philosophy which sprang up in Germany exposed him to attacks from the pens of Herder, Goethe, Schiller, Lavater, and Fichte. —Among N.'s works, *Characteristische Anecdoten von Friedrich II.* (Berl. 1788–92) is of permanent value: his novels are forgotten: his *Autobiography* was pub. 1806.

NIC'OLAI, OTTO: German musical composer: 1809–48; b. Königsberg. His early life was a struggle with poverty and difficulties. He studied three years in Berlin, and three years (1835–38) in Rome. After travelling ten or twelve years over Europe, he became, 1847, Kapellmeister at Berlin, but soon resigned. His first dramatic work of importance was *Il Templario*, founded on Scott's romance *Ivanhoe;* which, produced at Turin 1841, attained high and permanent reputation. In 1848 he wrote, at Berlin, *Die Lustigen Weiber von Windsor*, on which his renown as a musician is founded—a work charming for its clear design and lively, vigorous tone. whose overture is almost worthy of Weber. Two months after its production, its composer died at Berlin.

NICOLAITANS, *nĭk'ō-lā'ĭ-tănz:* heretical party in the primitive churches; referred to in Rev. ii. 6, 15, the church of Ephesus being commended as hating the deeds of the N., and the church of Pergamos warned as harboring those that hold the doctrine of the N. Nothing further is known on the subject. The name is doubtless from some leader, Nikolaos; but there is no reason to identify him with the Nicolas of Acts vi. 5. The Greek word is thought to resemble in meaning the Hebrew Balaam; and therefore the doctrine of the N. and 'the doctrine of Balaam,' spoken of together, though distinguished, are supposed to be different shades of the same corruption in doctrine and practice. The Balaamites are fully characterized Rev. ii. 14, II Pet., and by Jude. In general, the corruption that found place here and there was a perversion of Christian liberty to evil license;

in particular, a freedom was claimed not only to eat meats offered to idols, when sold with other meats in the markets (which was permitted by apostolic authority), but also to partake of idol feasts; and idol feasts, it is well known, were customarily followed by the vilest orgies—hence the danger and the corruption referred to in the apostolic warnings.

NICOLAS, *nĭk'o-las*, SAINT: one of the early bishops of Myra in Lycia; highly popular saint of the Rom. Cath. Chh.; and reverenced with still greater devotion by the Russian Chh., which regards him as a special patron. The precise date of his episcopate is a subject of controversy. According to the popular account, he was a confessor of the faith in the last persecution under Maximinian, and, having survived until the Council of Nice, was one of the bishops who sat in that great assembly. This seems highly improbable. His name does not occur among the signatures to the decrees, nor is he mentioned with the other distinguished confessors of the faith present at the council, either by the historians, or, what is more important, by St. Athanasius. He may, with more probability, be referred to a later period; but he certainly lived prior to the reign of Justinian, in whose time several of the churches of Constantinople were dedicated to St. Nicolas. Of his personal history, hardly anything is known; and the great popularity of the devotion to him rests mainly on the traditions, both in the West and in the East, of the many miracles wrought through his intercession. He is regarded in Rom. Cath. countries as the especial patron of the young, particularly scholars. In England, his feast was celebrated in ancient times with great solemnity in the public schools, Eton, Sarum Cathedral, and elsewhere; and a curious practice, founded on this characteristic of St. N., still subsists in some countries, especially in Germany. On the vigil of his feast, which is on Dec. 6, a person in the appearance and costume of a bishop assembles the children of a family or of a school, and distributes among them, to the good children, gilt nuts, sweetmeats, and other little presents, as the reward of good conduct; to the naughty ones, the redoubtable punishment of the 'Klaubauf.' In some countries, St. N. is regarded as the patron saint of parish clerks, sailors, and thieves. The supposed relics of St. N. were conveyed from the East to Bari, in the kingdom of Naples, toward the close of the 11th c.; and it is a curious fact that in the Russian Church the anniversary of this translation, May 9, is still observed as a festival. SANTA CLAUS is a form of the same name—the well-known New York Dutch Christmas saint, the Amer. Kriss Kringle of Holland, dear to children, and remembered in annual festival by the St. N. Soc. of New York. This identification is accounted for by the nearness of St. N.'s day (Dec. 6) to Christmas week

NICOLLET, *nĭk-ol-lā′*, Jean Nicolas: 1786, July 24—1843, Sept. 11; b. Savoy, France. He studied at a college in Cluses, Savoy; became assistant professor of mathematics at Chambéry; went to Paris, where, 1817, he had charge of the library of the Paris Observatory; studied astronomy with Laplace, and assisted in the preparation of some of his works. He visited this country 1832, and made a scientific exploration of the Mississippi valley, and the sources of the Arkansas, Missouri, and Red rivers, and the head-waters of the Mississippi. He also studied the dialects and habits of various Indian tribes. With Lieut. Fremont, he was sent by the government to explore the far west, and report on its natural features and resources.

NICOLLS, *nĭk′olz*, Sir Richard: governor of New York, 1624—72, May 28; b. England. When 18 years of age he entered the army, fled to Holland on the defeat of the royalists, served in the continental wars, and was appointed by Charles II. chief of the 4 commissioners to harmonize the various factions in the New England colonies and obtain control of New Netherlands. He sailed from England 1664, May; and Sept. 8 secured the desired territory from the Dutch, changing its name to New York. Nicolls was a wise governor, and won the regard of the people. He returned to England 1668, was in the war with Holland and lost his life in a naval battle.

NICOMEDEIA, or Nicomedia, *nĭk-ō-mē-dī′a:* capital of anc. Bithynia, at the n.e. angle of the Gulf of Astacus, in the Propontis, now called the Bay of Ismid. It was built about A.D. 264 by Nicomedes I., who made it the capital of his kingdom; and it soon became one of the most magnificent and flourishing cities in the world, and some of the later Roman emperors, such as Diocletian and Constantine the Great, selected it for their temporary residence. It suffered greatly both from earthquakes and the attacks of the Goths. Constantine died at a royal villa in the immediate vicinity. Hannibal committed suicide in a castle close by. It was the birthplace of the historian Arrian. The small town of Ismid or Isnikmid now occupies its site.

NICOPOLIS, *nē-kŏp′ō-lĭs:* a former Turkish fortress, but since 1878 a city of the newly constituted principality of Bulgaria; on the Danube, about 56 m. w. of Rustchuk. The fortifications, though extensive, were never of much importance, and the Berlin congress of 1878 provided for their demolition. Nicopolis is widely built, most of the houses being surrounded by gardens. It is an important market for Wallachian wares, but otherwise has little trade. Pop. 16,000.

Nicopolis, the ancient *Nicopolis ad Istrum*, was founded by Trajan in memory of his victory over the Dacians, and fragments of the old wall remain. Here the Hungarians,

under their king Sigismund, were defeated by the sultan Bajazet I., 1396. The city gives title to a Greek aop. and to a Rom. Cath. bishop.

NICOP'OLIS, or ACTIA NICOPOLIS: city in Epirus, founded by Octavian (Augustus) in commemoration of his victory over Antony and Cleopatra at Actium. It was settled by colonists from the neighboring countries (Ambracia, Calydon, Argos Amphilochicum, etc.), and was considered the capital of s. Epirus and Acarnania. During the middle ages, the city, wasted by barbarian invasions, was supplanted by the town of Prevesa. The ruins of N., now known as Paleoprevesa (Old Prevesa), comprise the remains of the acropolis, of 2 theatres, and of an aqueduct.—N. was the name also of a city in Cappadocia, founded by Pompey; and of one in Egypt, founded by Octavian, to commemorate his final victory over Antony.

NICOSI'A, *nē-kō-sē'a:* city of Sicily, province of Catania, 70 m. s.w. from Messina; on the crest of a steep, conical hill between two head-branches of the Salso. It has scarcely any manufactures, but has some trade in corn, wine, oil, and cattle. Near it are beds of alum schist, a rich mine of rock-salt, and springs of petroleum. Pop. 15,250.

NICOSIA: capital of Cyprus: see LEFKOSIA.

NICOTIAN, a. *nĭ-kō'shĭ-ăn* [from *Nicot*, a Frenchman who first sent the seeds of tobacco (obtained from a Flemish trader in Florida) into France, 1560]: pert. to or denoting tobacco. NICOTIANIN, n. *nĭ-kō'shĭ-ă-nĭn*, the volatile oil of tobacco, possessing the smell of tobacco-smoke. NICOTINE, or NICOTIN, n. *nĭk'ō-tĭn*, a highly acrid, pungent, and poisonous principle, extracted from tobacco (see below). NICOTIANA, n. *nĭ-kō-shĭ-ā'nă*, a genus of plants, which includes the tobacco-plant, ord. *Solanācĕæ:* see TOBACCO.

NICOTINE, or NICOTIN, *nĭk'ō-tĭn*, or NICOTINA, *nĭk-ō-tī'na*, or NICOTYLIA, *nī-kō-tĭl'ĭ-a* ($C_{10}H_{14}N_2$): one of the natural volatile oily bases destitute of oxygen; constituting the active principle of the tobacco plant, in the leaves, roots, and seeds of which it occurs in combination with malic and citric acids. It is contained likewise in the smoke of the burning leaves. It is a colorless, intensely poisonous liquid, of specific gravity 1·048, which boils at 480° F. with partial decomposition, without decomposition in a stream of hydrogen at 302°—392° F.; evolves a very irritating odor of tobacco, especially on application of heat, is very inflammable, and burns with smoky flame. It is moderately soluble in water, and dissolves readily in alcohol and ether. If exposed to the air, it absorbs oxygen, and becomes brown, and ultimately solid. The quantity of N. contained in tobacco varies from 2 to 8 per cent.; the coarser kinds containing the larger quantity, while the best Havana cigars seldom contain more than 2 per cent., and often less.

A remarkable case of poisoning by N.—that of the

Count Bocarmè, who was tried and executed in Belgium for the murder of his brother-in-law—is recorded in the *Annales d'Hygiène* 1851, and was the occasion of Orfila's publishing his *Mémoire sur la Nicotine.* A distinguished student of the College of Chemistry subsequently employed it for suicide. The deaths from the use of tobacco in the form of injection—of which several cases are on record—were doubtless due to the action of this substance.

NICOYA, *nē-kō'yâ*, GULF OF: arm of the Pacific, indenting the n.w. coast of Costa Rica, between the mainland and the peninsula of Nicoya, whose s. extremity is Cape Blanco. The gulf extends n. and s. about 55 m.; is about 30 m. wide at its mouth, between Cape Blanco on the w. and Cape Herradura on the e.; contains several small islands, the principal being Venado, Bejuca, San Lucar, Castillo, and Chira. The largest rivers emptying into it are the Rio Grande, Nicoya, and Tempisque. Punta Arenas, the only port of entry on the Pacific side of Costa Rica, is on the e. side of the gulf.

NICTATE, v. *nĭk'tāt*, or NICTITATE, v. *nĭk'tĭ-tāt* [L. *nictātus*, winked—from *nictārĕ*, to make a sign with the eyes]: to wink. NIC'TATING, imp., or NIC'TITATING, imp.: ADJ. winking. NIC'TATED, pp., or NIC'TITATED, pp. NICTATION, n. *nĭk-tā'shŭn*, or NICTITATION, n. *nĭk'-tĭ-tā'shŭn*, the act of winking. NICTITATING MEMBRANE, a fold of skin with which birds cover their eyes.

NIDIFICATE, v. *nĭd'ĭ-fĭ-kāt* [L. *nidificatus*, built a nest—from *nidus*, a nest; *facĭō*, I make]: to build nests. NID'IFICATING, imp. NID'IFICATED, pp. NID'IFICA'TION, n. *-kā'shŭn*, the act or process of building a nest and hatching and rearing the young.

NIDULANT, a. *nĭd'ū-lănt* [L. *nidulans* or *nidulan'tem*, making a nest—from *nidus*, a nest]: nestling, as a bird in its nest; in *bot.*, imbedded in pulp, as in a nest; partially incased in some covering. NID'ULA'TION, n. *-lā'shŭn*, time of remaining in the nest.

NIDULITES, n. plu. *nĭd'ū-līts* [L. *nidus*, a nest; Gr. *lithos*, stone]: certain organisms occurring in Silurian strata—so called because supposed to be egg-masses.

NIDUS, n. *nī'dŭs* [L. *nidus*, a nest]: a term for any place where parasites, worms, or insects lodge and lay their eggs; a neet or hatching-place; a hatching-place for infectious diseases.

NIEBUHR, *nē'bôr*, BARTHOLD GEORG: one of the most acute historians, critics, and philologists of modern times: 1776, Aug. 27—1831, Jan. 2; b. Copenhagen, where his father, Karsten N. (q.v.), then resided. N.'s early aptitude for learning led him to be regarded as a juvenile prodigy; and, unlike many other precocious children, his powers of acquiring knowledge kept pace with his advancing years. After careful preliminary education, under the superintendence of his father, he spent a session at Göttingen studying law, and thence went, in his

19th year, to Edinburgh, where he gave special attention to the natural sciences. On his return to Denmark, he became private sec. to the finance-minister, Schimmelmann, and till 1804 held appointments under the Danish government, which, however, he resigned in consequence of his strong political tendencies, including the profound German detestation of Napoleon. N. even sought admission into the regular army of Prussia, but without effect; however, he entered the Prussian civil service 1806, and during the three succeeding years he shared in the vicissitudes which befell the govt. of his chief, Count Hardenberg, after the disastrous battle of Jena, and the consequent pressure of the Napoleonic influence on the management of the state. He was commissioner on the national debt, and for a short time Prussian minister to Holland. His excessive sensitiveness unfitted him for practical politics; and the opening of the Univ. of Berlin, 1810, was a new era in the life of N., who —having accepted a position there as prof.—gave a course of lectures on Roman history, which, by making known the results of the new and critical theory which he had applied to the elucidation of obscure historical evidence, established his position as one of the most original and philosophical of modern historians. His appointment, 1816, to the post of Prussian ambassador at the papal court, where he remained till 1823, gave him an opportunity of testing on the spot the accuracy of his conjectures on many questions of local and social bearing. On his return from Rome, N. took up his residence at Bonn, where, by his admirable lectures and expositions, he greatly developed classical and archæological learning. He was thus employed when the revolution of 1830 roused him from his calm literary pursuits. N.'s sensitive nature, unstrung by physical debility, led him to an exaggerated view of the consequences of this movement, and to anticipate a recurrence of all the horrors of the former French Revolution; and the result was mental depression and bodily prostration, which ended in his death early in the following year. N.'s attainments embraced a more extensive range than most men are capable of grasping, for he was distinguished alike as a shrewd man of business, an able diplomatist, an accurate scholar, and a man of original genius. He had mastered 20 languages before the age of 30 years, while the mass of facts which his tenacious memory retained, and the intuitive sagacity that enabled him to sift true from false historic evidence, and often to supply by felicitous conjecture the link wanting in some imperfect chain of evidence, show the extraordinary scope of his intellect. It is not to be denied, however, that he is sometimes arbitrary and unhistorical in his conjectures; and a few of the stricter sort of skeptical critics, like the late Sir George Cornewall Lewis, even go so far as to regard his effort to construct a continuous Roman history, out of such legendary materials as we possess, as, on the whole, a failure. But almost universally it is conceded that N. was the first

writer to deal with the ancient history of Rome in a scientific spirit. His work made an epoch; though the nature of the work which he essayed to do was not so much history as historical criticism. He is not an artistic narrator and descriptive painter of men; but, as has been said of him, 'N.'s treatment of *institutions* was an actual contact.' He had a luminous intellect, strong affections, a magnanimous nature, quick sympathy with all that is noble and pure, an honest and simple heart. His oversensitiveness sometimes interfered with the free action of his judgment. Among the many important works with which he enriched the literature of his time, the following are some of the most noteworthy: *Römische Geschichte* (3 Bde. Berl. 1811–32; 2d ed. 1827 42; 33; 53)—the first two vols. have been translated by J. C. Hare and C. Thirlwall, and the third by Dr. W. Smith and Dr. L. Schmitz; *Grundzüge für die Verfassung Niederlands* (Berl. 1832); *Griech. Heroengeschichte* (Hamb. 1842), written for his son Marcus; the *Kleine historische und philologische Schriften* (2 Bde. Bonn 1828–43) contain his introductory lectures on Roman history, and many of the essays which had appeared in Transactions of the Berlin Academy. Besides these, and numerous other essays on philological, historical, and archæological questions, N. co-operated with Bekker and other learned annotators in re-editing *Scriptores historiæ Byzantinæ;* he also discovered hitherto unprinted fragments of classical authors—e.g., of Cicero's *Orations* and portions of Gaius, —published the *Inscriptiones Nubienses* (Rome 1821), and was a constant contributor to the literary journals of Germany. See Miss Winkworth's *Life and Letters of N.* (3 vols. 1852); Classen's *N.* (1876).

NIEBUHR, KARSTEN: distinguished geographer and traveller· 1733, March 17—1815, Apr. 26; b. Lüdingworth, Lauenburg, in the Hanoverian territory of Hadeln, on the confines of Holstein: son of a small farmer, and father of Barthold Georg N., historian of Rome. Early thrown on his own resources, he spent several years of his youth as a day-laborer; but his natural taste having led him to study geometry, and having acquired a little money, he went to Göttingen, where he attended the classes at the univ. until his resources were exhausted. At this period he entered the Danish service, and 1761 he joined the scientific expedition which King Frederick V. sent to explore certain portions of Arabia, with a view of illustrating some passages of the Old Testament. The expedition reached Cairo at the close of 1761, and after having carefully explored the pyramids, and crossed the desert to Mount Sinai and Suez, proceeded to Arabia Felix. Here, however, the various members of the expedition, which included the eminent naturalist Forskäl, began to fall victims to the diseases of the climate; and at length all perished except N., who had suffered severely from fever, but had adopted the diet and dress of the natives—thus probably saving his life. He proseeuted his travels with extraordinary resolution for more than six years, going as far as India, visiting also Persia and Asiatic Turkey. On his return to Denmark, 1767, N. published the results of his important mission, which appeared in German under the following titles, *Beschreibung von Arabien* (Copenh. 1772), and *Reisebeschreibung von Arabien und andern umliegenden Ländern* (Copenh. 1774–78, 2 vols,); the publication of vol. III. of this work was unfortunately delayed by numerous other engagements; and more than 20 years after his death the book made its appearance under the supervision of N.'s daughter, and through the liberality of the eminent bookseller Perthes of Hamburg. In addition N. edited and published at his own cost the natural-history notes of his deceased friend and fellow-traveller, P. Forskäl, which he arranged in two works, *Descriptiones Animalium*, etc. (Copenh. 1775), and *Flora Ægyptiaco-Arabica* (Copenh. 1776). The accuracy of detail, fidelity of delineation, and careful avoidance of all exaggeration, which charaeterize N.'s geographical and social descriptions of Arabia and other Asiatic countries, have made his works classical textbooks for all who wish to study the subject. Although N. accepted, 1778, a civil post, which fixed his residence in the remote provincial town of Meldorf, in the Ditmarsh district of Holstein, where he applied himself during the rest of his life to his official duties, he never relinquished his interest in scientific inquiry, and contributed several valuable papers on the geographical and political history of the nations of the east to the *Deutsche Museum*, and other periodicals He was not brilliant nor widely accomplished; indeed to the last, he remained somewhat of a peasant; but he had scholarly instincts and high moral purpose; and ranks as one of the most truthful and scientifically exact travellers of modern times.

NIECE, n. *nēs* [F. *nièce*, a niece—from mid. L. *neptiă* —from L. *neptis*, a granddaughter: L. *nepos*, a grandson, a nephew]: the daughter of a brother or sister.

NIECKS, *nēks*, FREDERICK: Anglo-German composer and critic: b. Düsseldorf, Germany, 1845, Feb. 3. He was educated at Leipsic University and was a violinist and music teacher in his native city till 1865 when he settled in Scotland, where he was for some years engaged in teaching music, and since 1875 he has written much for musical journals. Since 1891 he has been Reid professor of music at the University of Edinburgh. He has published: *A Concise Dictionary of Musical Terms* (1884); *Chopin as a Man and Musician* (1888).

NIELLO, n. *nĭ-ĕl'lō* [It. *niello*, curved or wavy work in gold or silver: F. *nicle*, dark enamel-work]: species of ornamental engraving resembling damask-work; a specimen of the early fathers of copperplate printing.—*Niello-work* is a method of ornamenting metal plates by engraving the surface, and rubbing in a black or colored composition, so as to fill up the incised lines, and give effect to the intaglio picture. It is not known when this art originated; Byzantine works of the 12th c. still exist to attest its early employment. The finest works of this kind belong to the first half of the 15th c., when remarkable excellence in drawing and grouping minute figures in these metal pictures was attained by Maso di Finiguerra, eminent painter, and student of Ghiberti and Massacio. In his hands it gave rise to copperplate engraving (see ENGRAVING): hence much interest attaches to the art of niello-cutting. Genuine specimens of this art are rare; some of those by Finiguerra are very beautiful and effective, the black pigment in the lines giving a pleasing effect to the surface of the metal, which is usually silver. Those of his works best known are some elaborately beautiful pattines wrought by him for the church of San Giovanni at Florence, one of which is in the Uffizia, and some are in various private collections. In the collection of Ornamental Art at South Kensington, there are no less than 17 specimens of this art.

NIEMANN, *nē'mân*, ALBERT, German operatic tenor: b. Erxleben, near Magdeburg, 1831, Jan. 15. At first a worker in a machine factory, he became an actor in 1849; was trained in singing by Schneider, hofkapellmeister at Dessau, and by Musch, a baritone; appeared at Berlin, Stuttgart, and Königsberg; and after further study under Duprez at Paris, was made 'kammersänger' to the emperor and attained great success throughout Germany. From 1866 until his retirement in 1889 he was connected with the court opera of Berlin, where he was distinguished in heroic roles. Wagner selected him to impersonate Siegmund in *Die Walküre* at Baireuth in 1876. He appeared with success in the United States in 1887-8.

NIEMEN, *nē'mėn* (called by the Germans *Memel, mā'mėl*): river in Prussia, rising a few m. s. of the city of Minsk, flows w. to Grodno 180 m. n. and w. along the frontiers of the Polish province of Augustowo, and w. through E. Prussia to the Kurische Haff; entire length, 640 m. It is navigable for large craft at Grodno, 400 m. from its mouth; and is free of ice from March to Nov. Between Grodno and Kovno are 55 rapids and shallows, and pilots are therefore required for navigation. At Winge, 8 m. below Tilsit, the Niemen divides into two branches, of which the n., the Russ, reaches the Kurische Haff by nine mouths; and the s., the Gilge, by seven mouths. The delta is traversed by numerous canals. The Niemen is of considerable commercial importance. Large barges bring down the produce of Lithuania and of a portion of Poland to Königsberg and Memel. Its principal affluent is the Vilna on the right.

NIEMEYER, *nē'mī-ĕr*, Felix von: German physician, grandson of the poet and theologian August Hermann Niemeyer: b. Madgeburg 1820, Dec. 31; d. Tübingen 1871, March 14. He was educated at Halle; practised in Madgeburg 1844-55; was professor of pathology and therapeutics at Greifswald, and from 1860 at Tübingen; was military surgeon during the Franco-Prussian war; was ennobled for his services to the king of Würtemberg; and wrote a *Text-Book of Special Pathology and Therapeutics* (1858), often republished and distinctly valuable.

NIEPCE DE ST. VICTOR, *nē-ĕps' dėh săng vĭk-tėr'*, Claude-Felix-Abel: French chemist and photographer: 1805, July 26—1870, April; b. Saint Cyr, near Chalon-sur-Saone; nephew of Joseph Nicéphore N., one of the inventors of photography (see Daguerre: Photography). He served in the army; but having made an important chemical discovery in connection with dyeing, he was permitted to exchange into the municipal guard of Paris, for greater facility of scientific studies. This was in 1845, at which time his attention was specially drawn to the important discoveries in photography by his uncle Nicéphore Niepce. He was led, 1847, to the discovery of methods for obtaining images on glass, coated with albumen, starch, or gelatin, and for reproducing designs by the use of vapor of iodine; and his effort was given especially to obtaining photographic images in colors; and before the close of 1852, he had succeeded in obtaining faithfully colored images of flowers natural and artificial, colored engravings, gold and silver lace, etc., upon silvered plates which had been sensitized by a chloride of copper. In obtaining these pictures, both photographic printing and the camera were employed; but to his intense disappointment, he found that the colors soon faded, and after a time disappeared. This process he named 'Heliochrome.' His third and most important invention, the art of 'Heliography,' or production of engraved steel-plates by photography, was first communicated to the Acad. of Sciences

1853, May. The credit of originating the idea is not his: for his uncle, previous to 1839, had communicated an imperfect sketch of a similar invention to M. Arago; and Mr. Talbot and others had succeeded by a similar process in obtaining images of simple objects on steel-plates: but to Niepce belongs the credit of having removed the almost insurmountable manipulative difficulties, and rendered the process of much more general application, thus making it practically serviceable.

In 1855, he published his various memoirs under the title *Recherches Photographiques*, followed 1856 by *Traité Pratique de Gravure sur Acier et sur Verre*. Niepce's scientific studies did not interfere with his military promotion.

NIETZSCHE, *nĕtz'shĕ*, Friedrich Wilhelm: German philosopher: b. Röcken, near Lützen, 1844, Oct. 15; d. 1900, Aug. 25. He was educated at Bonn and Leipsic, and on the recommendation of Ritschl obtained a professorship in classical philology at Basel in 1869, became known as a brilliant writer of increasingly philosophical tendency, and was compelled by troubles of eye and brain which had asserted themselves as early as 1876, to retire on a pension in 1879. For the rest of his life he lived chiefly at health-resorts, until in 1888 he was pronounced incurably insane. The circumstances of his career must be included in a judgment of his writings. He developed no system and no body of sustained thought. His works are rather a series of aphoristic presentations of unconnected and often contradictory viewpoints. Thus, he dislikes the modern democratic idea, and becomes an aristocrat; but he equally dislikes the idea of the sovereignty of the state, and is an anarchist. He denounces Schopenhauer for pessimism, but does not get beyond Schopenhauer. His is a consistent philosophy only in its universal revolt. He is an atheist and regards the consideration of aught but strength as a remnant of Christian superstition. The catalogue of Christian virtues he rejects, making his ideal the Uebermensch (over-man), who tramples under-foot whatever he thinks may oppose him. At an early period he was an enthusiastic admirer of Richard Wagner, whom later he quite as enthusiastically attacked. So counter is Nietzsche to the best thought of the 19th century that it may be doubted if he would be much read were it not for the epigrammatic brilliance of his style. Among his works are: *Unzeitgemässe Betrachtungen* (1873-6); *Morgenröthe* (1881); *Sprach Zarathustra* (1883-4); *Götterdämmerung* (1888). The last two have appeared in English renderings. There is a complete German edition (1895-1901), and an uncompleted biography by E. Förster-Nietzsche (Vol. I. 1895). Consult also Kaatz *Die Weltanschauung Fr. Nietzsches* (1891-2); Dolson *The Philosophy of Nietzsche* (1901); *Cornell Studies in Philosophy* (No. 3); Drews, *Nietzsche's Philosophie* (1904); Kronenberg, *Nietzsche und seine Herrenmoral* (1901).

NIEUWVELDT MOUNTAINS, *nyüv'vělt:* portion of the most northerly of the three ranges of mountains in Cape Colony, which all at various distances from the s. coast run parallel to it. Of these three ranges, the most n. attains the greatest average height, 7,000 feet. The mountains known as the N. M. extend in lat. 31° 40′ to 32° 30′ s., and are intersected by the meridian of 22° e. long. From their s. slopes, the Gamka or Lion river draws its head-waters; and from their n. the Gariep or Orange river obtains an important tributary in the Upper Zak.

NIÈVRE, *nē-āvr':* central dept. of France, occupying a portion of the watershed between the Loire and the Seine; bounded w. by the rivers Allier and Loire; 2,620 sq. m. Mountains occupy the e. border, and extend in a line of heights from s.e. to n.w., dividing the dept. into two great declivities. The soil is generally rocky and sandy, cut up by ramifications, almost always wooded, of the mountains of Morwan. There are several plateaux more or less fertile, a number of hills covered with vines, and valleys productive in pastures; but the principal wealth consists in forests and minerals. The Nièvre, whence the name of the dept., is an inconsiderable affluent of the Loire from the right. The three chief rivers—the Allier, Loire, and Yonne—are navigable, and the Yonne, which belongs to the system of the Seine, is connected with the Loire by a canal across the watershed. Of the entire area, more than 792,000 acres are cultivable land, and more than a third of the whole surface is covered with forests, the timber from which, forming one of the principal sources of wealth, is conveyed by water in great quantities to Paris, etc. About 6,000,000 gallons of wine are made yearly. From the mines of N. iron of good quality is obtained in abundance; lead, copper, and silver also are found; and there are coal mines, and quarries of marble and granite. Arrondissements, Nevers, Château-Chinon, Clamecy, and Cosne; capital, Nevers. Pop. (1891) 343,581; (1901) 323,783.

NIFLHEIM, *nĭfl hām* [from the same roots as Lat. *nebula*, cloud, and Eng. *home*, meaning the abode of clouds]: in the old Scandinavian mythology, one of the nine separate abodes or homes, of which the Scandinavians conceived the world as consisting in the beginning of time. It is the kingdom of cold and darkness, and is separated from Muspelsheim, the kingdom of light and heat, by a huge chasm (Ginnungagap [q.v.] yawning gap). Here flows the spring Hvergelmir, watched by the dragon Nidhugger; this spring sends out 12 ice-rivers, from the drops of which, thawed by sparks from Muspelsheim, sprang the chaotic giant Ymir and the cow Audhumbla. N. was also the abode of Hel (q.v.), the goddess of death, who here received all who died of sickness or old age.

NIGELLA, *nī-jĕl'la:* genus of plants of natural order *Ranunculaceæ*, having five colored spreading sepals; five or ten small two-lipped petals, with tubular claw; the carpels more or less connected together, many-seeded; leaves divided into threadlike segments, flowers solitary at the top

of stem or branches. They are annuals, natives chiefly of the countries near the Mediterranean and warmer temperate parts of Asia. Some, occasionally seen in gardens in Britain, are vulgarly known by the names *Devil-in-a-bush*

Nigella sativa :
a, top of stem, with leaves and flowers ; *b*, fruit.

and *Devil-in-a-mist*. The seeds are aromatic, and somewhat peppery. Those of *N. sativa*, species common in cornfields in s. Europe, are supposed to be the BLACK CUMMIN of the ancients, perhaps the CUMMIN of the Bible. The seeds of a specie of N. are much used by the Afghans for flavoring curries.

NIGER, *nī'jėr:* the great river of w. Africa. Its name, according to Dr. Barth, is a contracted form of one of the native names, *N-eghirrĕu*, which, as well as all the other names, *Dhiúlibá* (*Joliba*), *Máyo*, *I'sa*, *Kwára* (*Quorra*), and *Báki-n-rúwa*, means simply 'the river.' The principal head-water rises on the slopes of Mt. Loma, peak of the Kong Mountains, in a barren, desolate, and treeless region, lat. 9° 25′ n., long. 9° 45′ w., about 1,600 ft. above sea-level. It flows n.e. to Timbúktu, where it bends e. for about 250 m., then curves toward the s., and proceeds in a general s.s.e course, until arriving at the head of its delta, lat. about 5° 30′ n., it separates into a multitude of branches, and enters the Gulf of Guinea, between the Bights of Benin and Biafra. It is called the Timbri for the first 70 m. of its course, after which it receives the name of the Joliba, or more correctly Dhiúlibá (Mandingo word for Great river), and after passing Timbúktu, it is known principally as the Quorra or Kworra. Little is known of its course until it reaches Sego (lat. 12° 30′ n.), 350 m. from its source; but from that point it has been explored through nearly the whole of its length. From Sego to Timbúktu it flows through a fertile country, producing rice, maize, and vegetables, and abounding in good pasturage. In lat. 14° 10′ n., the river separates into two branches; the w. is called the Joliba or Mayo, the e. the Bara-Isa. These, as they pro-

ceed, are known as the White and Black rivers respectively; and they unite after inclosing the island of Jimballa, 220 m. in length, and 2 to 20 m. in breadth. The river again bifurcates before arriving at Timbúktu, and after passing that town, the two branches, on one of which —the northern—the Cabra, the port of Timbúktu is situated, again unite. In the district of union, s.w. of Timbúktu, the country far and wide is intersected by numberless streams, forming a complicated net-work of watercourses. The river then flows e., sending off many creeks and branches to Bamba; its banks here are low and marshy, and during the rainy season are overflowed. In this region, rice, tobacco, wheat, and even barley are grown. The river then passes the town of Burrum, where it curves s.e., and from this point—called from the bend, the *Knee of Burrum*—it bears the name Kworra or Quorra until it reaches its delta. Immediately below *Burrum*, the N. does not present an imposing appearance. Its bed resembles a broad marshy valley, inclosed by ridges of rock or high dunes, thickly overgrown with reeds and sedges, and cut up by numberless streams and creeks. At the ferry of Burri (lat 15° 55′ n.) the breadth of the river is 2,400—2,700 ft.; and here the whole valley, about 10 m. broad, is fruitful, carefully cultivated, and well peopled. Further s. the towns of Garu and Sandu are passed, where the bed is rocky and navigation dangerous. At the town of Say, the N., after reaching a breadth of 2,500 to 3,000 paces, is narrowed to 1,000 paces, flows at the rate of 3 m. an hour, and is inclosed by rocky banks. From Say to Gimpa (70 m.) its course remains unknown. From Wara, it flows e.s.e. to Rabba; and from this town to its mouth, the course of the river is comparatively well known. In lat. between 8° and 7° 30′ n., it flows round the eastern shoulder of the Kong Mountains (2,000 to 3,000 ft. high), where its banks are extraordinarily beautiful. In lat. 7° 40′ n., it receives the Benne from the east. The delta consists of an immense mangrove forest, cut up into islands by the numerous branches (22 in number) of the river. The principal mouths are the Bonny Mari, and Nun.

The existence of the N. seems to have been made known in ancient times first by travellers from the s. shores of the Mediterranean, who, crossing the great desert, came upon the upper course of a great river flowing toward the rising sun. This river Herodotus supposed to be a branch of the Egyptian Nile. Pliny speaks of the *Nigris* of Ethiopia, but he also thought that it flowed into the Nile. Even until the present century it was supposed to be a part of the Nile. No definite notion of the river had been formed until it was visited by Mungo Park July, 1796 this traveller explored its banks 160 m.: see PARK, MUNGO. Caillié explored the river from the town of Jennee to Timbuktu, and the English expedition of 1832, under Lander and Allen, proved that the Quorra was navigable from Boussa to the sea. The Church Miss'y Soc. (England) has done much to open the lower N. to Europeans, it maintains four

stations on the coast, and five from 120 to 420 m. inland. In 1882, the French govt. began laying a railway to connect Kai, at the head of navigation on the Senegal, with the Niger. In 1854, Dr. Barth followed the course of the river from Timbûktu to Say. In 1879, M. Verminck, merchant of Sierra Leone, equipped two of his clerks, MM. Zweifel and Moustier, who explored part of the principal head-stream of the N. The entire length of the river is estimated at more than 2,500 miles.

NIGERIA, *nī-jĕ'rĭ-a*, or NIGER (*nī'jẽr*) TERRITORIES: West Africa, an extensive British colonial possession on the lower Niger, organized since 1900, within the boundaries arranged by the Anglo-German Agreements of 1885, 1886, and 1893, and the Anglo-French Agreements of 1889, 1890, and 1898. It comprises the Lagos Protectorate and Southern and Northern Nigeria, being bounded on the east by German Kamerun, and on the west and north by Dahomey and the French military territories. Nigeria includes the whole course of the Niger from a short distance above Ilo to its mouth, and also the left bank for a few miles higher up. The northern boundary runs irregularly eastward to a point on Lake Chad. Nigeria also includes the whole course of the Benue from a point above Yola to its confluence with the Niger at Lokoja. The coast-line extends from the Rio del Rey on the east, to near the mouth of the Benin River on the west, and thus includes all the mouths of the Niger. The total area is about 500,000 square miles: the mixed negrito population may amount to 30,000,000, chief of which are the Fulah or Fulani of the Hausa states. For administrative purposes the territory is divided into Northern and Southern Nigeria, the boundary line being drawn due east from Owo, on the Lagos frontier. The country is mainly a level or rolling plateau, but in the central districts there are mountain ranges and isolated peaks, many of them forest-clad, of considerable elevation. The Niger and the Benue are the chief rivers, the latter being especially valuable for navigation. The Gulbin-Sokoto is a perennial left-bank tributary of the Niger, and the Waube, flowing into Lake Chad, is also of some importance. The climate is tropical, with a dry (October-May) and a wet season. The mean annual temperature is about 80° F., but at some periods of the year the temperature in the shade may exceed 100°. Geologically, the region is formed mainly of granite and various metamorphic rocks, but sedimentary formations, chiefly sandstones and almost entirely belonging to the older periods, are also found. Silver, tin, antimony, lead, iron, and other minerals occur. Among the vegetable and agricultural products, most of which are exported, are cotton, indigo, palm-oil, palm kernels, groundnuts, india-rubber, ebony, camwood, gums, and coffee. Ivory and hides are also important exports, and among the native industries leather-working deserves mention. The greater part of Nigeria was administered by the Royal Niger Company till 1900, Jan. 1, when it was

bought out by the British government. This company was formed in 1882 as the National African Company, and four years later it received its royal charter. Most of what is now Southern Nigeria was not under the rule of the company, but formed from 1884 till 1893 the Oil Rivers Protectorate, and from 1893 till 1899 the Niger Coast Protectorate. The kingdom of Benin was incorporated in the Niger Coast Protectorate in 1897. The company's abolition of the legal status of slavery, and its prohibition of the importation of spirituous liquors into Northern Nigeria, are to be maintained by the imperial government. Consult: Bindloss, *In the Niger Country* (1899); Mockler-Ferryman, *British Nigeria* (1902).

NIGGARD, a. *nĭg'gėrd* [Icel. *hnöggr*, stingy; Norw. *nyggja*, to gnaw, to scrape: Sw. *njugg*, sparing: Lap. *nagget*, to scrape together]: sordidly unwilling to spend; miserly; meanly covetous; extremely sparing of expense; in *OE.*, sparing; wary: N. one who scrapes up money by little and little; one who is meanly covetous; one who spends grudgingly; a miser: V. in *OE.*, to supply sparingly: to stint. NIG'GARDLY, a. *-lī*, sordidly parsimonious; avaricious: AD. in a manner meanly covetous. NIG'GARDNESS, n. *-nĕs*, or NIG'GARDLINESS, n. *-lī-nĕs*, state of being niggardly; mean covetousness; extreme care in sparing expense. NIG'GARDISE, n. *-dīz*, in *OE.*, avarice; sordidness.—SYN. of 'niggardly, a.': miserly; avaricious; covetous; sordid; parsimonious; sparing; penurious.

NIGGED ASHLAR, n. *nĭgd ăsh'lėr* [Sw. *nagga*, to gnaw, to nibble: prov. Eng. *nig*, to clip money]: stone hewn with a pick or a pointed hammer instead of a chisel.

NIGGER, n. *nĭg'ėr* [L. *niger*, black]: a negro; a colored slave; a species of caterpillar—known also as a *black-jack*.

NIGH, a. *nī* [Goth. *nehv;* Ger. *nahe;* AS. *neah*, nigh: Dut. *na;* Icel. *ná*, nigh]: near; not distant or remote in time or place; contiguous; closely allied by blood; close in fellowship: AD. near to a place; almost; near by: PREP. near; almost close to. NIGHER, a. compar. *nī'ėr*, more nigh. NIGHEST, a. superl. *nī'ĕst*, most nigh. NIGH v. *nī*, in *OE.*, to draw near; to approach; to come near to, to touch. NIGH'ING, imp. drawing near. NIGHED, pp. *nīd*. Another OE. spelling is NYE, *nī*. NIGH'NESS, n. *-nĕs*, nearness; proximity.—SYN. of 'nigh, a.': near; close: contiguous; adjacent; proximate; present; intimate.

NIGHT, n. *nīt* [Goth. *nahts;* AS. *niht;* Icel. *nátt;* Ger. *nacht;* Lith. *naktis;* L. *nox*, or *noctem*, night]: the part of the day between sunset and sunrise; time of darkness; period from darkness until 12 o'clock; *figuratively*, death; adversity; obscurity; intellectual and moral darkness; frequently used in compounds to denote something that relates to night, as *night*-bird. NIGHTLESS, a.

nīt'lĕs, without a night. NIGHTLY, a. *nīt'lĭ*, done every night: AD. by night. NIGHTWARD, ad. *nīt'wĕrd*, approaching toward night. NIGHTED, a. *nīt'ĕd*, in *OE.*, black; darkened; clouded. NIGHT-CAP, a cap for wearing in bed at night: *familiarly*, a tumbler of warm punch or toddy taken immediately before going to bed. NIGHT-DEW, the dew formed in the night. NIGHT DRESS or GOWN, a loose undress or gown for sleep. NIGHTFALL, the close of the day; evening. NIGHT-FLY, a moth that flies in the night. NIGHT-GLASS, a sort of telescope, which, by concentrating a large amount of light, enables objects to be distinctly seen at night. NIGHT-HAWK, a well-known Amer. bird: a hawk that hunts its prey by night (see below): in *Scot.*, the night moth. NIGHT-JAR, the bird called Goatsucker (q.v.). NIGHT-LIGHTS, lights with a small flame used in bedrooms. NIGHT-MAN, one who empties cess-pools, etc., at night. NIGHTSHADE, the name given to several poisonous plants; the *Solānum nīgrum* (see below). DEADLY NIGHTSHADE, a highly poisonous plant: the *Atropa belladonna* (see BELLADONNA), ord. *Solanāceæ*. NIGHT-SOIL, the contents of cess-pools, etc. NIGHT-VISION, a dream in the night. NIGHT-WALKER, one walking at night in sleep; a somnambulist. NIGHT-WATCH, the watch placed at night, as on a ship at sea. BY NIGHT, during the night. IN THE NIGHT, suddenly; unexpectedly. TO-NIGHT, in this night; the night which follows to-day. *Note.*—NIGHTSHADE, as applied to the plants, is said to have arisen because of its use to blacken the eyes in mourning for the dead.

NIGHT BLINDNESS: abnormal inability to see at night or in a dim light. The patient may have almost normal vision in day light; but, when the amount of light is reduced, his sight fails much more than would be expected merely from the change in the external conditions. At times the loss of vision may be complete, although this is unusual. The condition may be a symptom of pigmentary degeneration of the retina, or only a functional disturbance due to general debility such as occurs in anæmia, scurvy, etc. Sometimes the defect appears in the opposite relation and it is then known as day blindness.

NIGHT'-HAWK (*Chordeiles Virginianus*): bird of the Goatsucker family (*Caprimulgidæ*), very common in America, from the Arctic islands to the W. Indies. It is a bird of passage, visiting the n. in summer. It is about nine inches in length, and 23 inches in expanse of wing. The gape is destitute of bristles. The tail is slightly forked. The general color is brown, but it is much mottled and marked with white: and there is a white mark on the throat, in shape like the letter V. The N. is seen pursuing its insect prey in the air, chiefly a little before sunset, and before dawn, and attracts attention by its rapid repetition of a sharp impatient cry, which has gained for it the name *Piramidig*. It produces also in its flight a remarkable hollow booming sound.

NIGHT'-HERON (*Nycticorax*): genus of *Ardeidæ* (see HERON), intermediate in form between bitterns and herons, but with shorter and thicker bill than either, and legs shorter than in herons. The N. Amer. species are the N.-H., or QUA-BIRD, or SQUAWK (*Nyctiardea grisea*, var. *nævia*), white before, passing into pale gray, with crown and scapulars glossy greenish black; and the yellow-crowned N.-H. (*N. violaceus*) with a tawny or white crest. The first closely resembles the European N. H. (*N. Gardeni*), which weighs nearly two lbs. Its plumage is soft, the general color ash-gray, passing into black on the neck and head, and into white on the breast and belly. The back of the head is adorned with three very long white feathers, which hang down on the neck. The nests are built in trees, and in general many together, forming a *heronry*. The N.-H. feeds chiefly by twilight or at night; and is never seen

Night-Heron (*Nycticorax Gardeni*).

standing motionless, like herons, but walks about in search of prey, by the sides of ditches, ponds, etc.; its food consisting chiefly of fishes, frogs, etc. Its cry is very loud and hoarse. Other species of N.-H. are found in Africa and Australia.

NIGHTINGALE, n. *nīt'ĭn-gāl* [Ger. *nachtigall*, the bird that sings by night: AS. *niht*, night; *galan;* Icel. *gala*, to sing: comp, L. *gallus*, a cock], (*Philomela*): genus of birds of family *Sylviadæ*, approaching in character to the *Merulidæ*, the young having their first plumage mottled, as in the thrushes, and the legs being longer than in the fauvettes and other *Sylviadæ*, with which they are commonly classed. The bill is straight, slender, not quite as long as the head; the wings do not much pass beyond the base of the tail; the first quill is very short, the third is the longest; the tail is slightly rounded. The COMMON N. (*P. luscinia*) is well known as the finest of songsters. It is rather larger than the hedge-sparrow, with about the same proportionate length of wings and tail. It is of rich brown color above, rump and tail reddish, lower parts grayish-white. The sexes are alike. It is a native of

many parts of Europe and Asia, and of n. Africa; and is a bird of passage, extending its summer migrations on the continent of Europe as far n. as s. Sweden; but in Britain it has scarcely ever been seen further n. than Yorkshire. It is plentiful in parts of s. and e. England, but is less common in the w. counties, and does not visit Wales or Ireland. It frequents thickets and hedges, and damp meadows near streams. The market-gardens near London are among its favorite haunts. It feeds much on caterpillars and other larvæ. It arrives in England about the middle of Apr., the males 10 or 14 days before the females. It is at this season, and before pairing has taken place, that bird-catchers generally procure nightingales for cage-birds, as they then become easily reconciled to confinement, while, if taken after pairing, they fret and pine till they die. The N. makes its nest generally on the ground, but sometimes on a low fork of a bush. The nest is loosely but ingeniously constructed of dead leaves, rushes, and stalks of grass, with lining of fibrous roots. The eggs are four or

Nightingale (*Philomela luscinia*).

five in number, of uniform olive-brown. The song of the male ceases to be heard as soon as incubation is over. In captivity, however, it is often continued longer. The N. usually begins its song in the evening, and sings with brief intervals throughout the night. The variety, loudness, and richness of its notes are equally extraordinary; and its long quivering strains give suggestion of plaintiveness as well as of passionate ecstasy, though there is no reason to suppose that any plaintiveness affects the bird at such times: the mind of the listener interprets the music in accordance with its own mood under the laws of association with the surroundings of the summer night. The N. has been a favorite from most ancient times; and is often mentioned in the poetry of India and Persia, as well as of Greece and Rome. The loves of the N. and the rose are a fanciful theme in which eastern poets delight. The N. much resembles the redbreast in manners, and is equally pugnacious. It has been known to breed with the redbreast in captivity.—There is another and rather larger species of N. in e. Europe, faintly mottled on the breast

NIGHTINGALE, Florence: famed for her labors in reforming the sanitary condition of the British army: b. Florence, Italy, 1823; daughter of William Shore N. of Embly Park, Hampshire, and Leigh Hurst, Derbyshire. Highly educated, and brilliantly accomplished, she early showed intense interest in the alleviation of suffering, which 1844, led her to give attention to the condition of hospitals. She visited and inspected civil and military hospitals all over Europe; studied with the Sisters of Charity in Paris the system of nursing and management in the hospitals; and, 1851, went into training as a nurse in the institution of Prot. Deaconesses at Kaiserswerth, on the Rhine. On her return to England, she put into thorough working order the Sanitorium for Governesses in connection with the London institution. Ten years was the term of apprenticeship thus served in preparation for the work of her life. In the spring of 1854, war was declared with Russia, and a British army of 25,000 men sailed to the East. Alma was fought Sep. 20, and the wounded from the battle, with the sick, were sent down to the hospitals prepared for their reception on the banks of the Bosphorus. These hospitals were soon crowded with sick and wounded, and their unhealthful condition became apparent in a rate of mortality to which the casualties of the fiercest battle were as nothing. In this crisis, Miss N. offered to go out and organize a nursing department at Scutari. The late Lord Herbert, then at the war-office, gladly accepted, and 1854, Oct. 21—within a week from the date of the offer—Miss N. departed with her nurses. She arrived at Constantinople Nov. 4, the eve of Inkermann—the beginning of the terrible winter campaign—in time to receive the wounded from that second battle into wards already filled with 2,300 patients. Her devotion to the sufferers can never be forgotten. She has stood 20 hours at a time, in order to see them provided with accommodation and all the requisites of their condition. In the spring of 1855, while in the Crimea organizing the nursing-departments of the camp-hospitals, she was prostrated with fever, the result of unintermitting toil; yet she refused to leave her post, recovered, and remained at Scutari till Turkey was evacuated by the British 1856 July 28. She, to whom many a soldier owes life and health, had expended her own health in the physical and mental strain to which she had subjected herself; and for years Miss N. has been an invalid, though continuing in her sick room to devise means for improvement of the health of the soldier. In 1857, she furnished the 'commissioners appointed to inquire into the regulations affecting the sanitary condition of the British army' with a paper of written evidence, in which she impresses, with the force and clearness which distinguish her mind, the great lesson of the Crimean War, which she charaterizes as a sanitary experiment on a colossal scale. The results which in the Crimea accumulated under her own eyes, showing that the rate of mortality among soldiers could be reduced to one-half of what it was in time of peace at home, turned the attention of Miss N. to the general question of army sanitary reform,

and first to that of army hospitals. In 1858 she contributed to the National Assoc. for Promotion of Social Science, two papers on Hospital Construction and Arrangement, afterward published with her evidence before the commissioners. The *Notes on Hospitals*, from their clearness of arrangement and minuteness of detail, are highly valuable to the architect, the engineer, and the medical officer. In 1858, she published *Notes on Nursing*, a text-book in many a household. At the close of the Crimean War a fund was subscribed to enable Miss N. to form an institution for training nurses: its interest amounts to £1,400 (about $6,800) per annum; and though no separate institution has been formed, the money is used in training a superior order of nurses in connection with St. Thomas's and King's College Hospitals. In 1863 was issued the Report of the Commission on the Sanitary Condition of the Army in India. The complete Report, with evidence, occupies two folio vols, of nearly 1,000 pp. each. The second of these huge folios is filled with reports from every station in India, occupied by British and native troops. These reports were sent in manuscript to Miss N., and at page 347 of vol. I. are inserted her observations on this immense mass of evidence. In these observations, the facts are brought together in an order, and with an incisive force of statement, which render it one of the most remarkable of public papers ever penned, fitted to open a new era in the government of India; for the views of Miss N. extend to the sanitary reform not only of the British army, but also of the towns of India. In 1871, she published *Notes on Lying-in-Institutions, together with a proposal for organizing an Institution for training Midwives and Midwifery Nurses;* in 1873, *Life or Death in India*, and (in *Fraser's Magazine*) 'A "Note" of Interrogation,' which attracted much attention, mainly by her manner of dealing with religious beliefs and life.

NIGHTMARE, n. *nīt'mär* [AS. *niht*, night; *mara*, a nightmare: Icel. *mara;* Dan. *mare;* Ger. *mahr*, a nightmare: Dut. *nagt-merrie*, nightmare: comp. Gael. *nochd-mearan*, a delirium in sleep—from *nochd*, night; *mearan*, delirium], (*Incubus Ephialtes*): painful, and usually frightful sensation in sleep of pressure on the breast, and phantom-seeing: an incubus; a certain overwhelming or stupefying influence. N. in sleep consists in a horrible dream, the terror being inspired by a sense of weight or oppression which the victim refers to the pressure of mountains, giants, hags, serpents, upon the breast; or to some unaccountable weight preventing movement or cry while being pursued by some monstrous enemy or in danger of fatal fall from a height. It is attributed to acceleration or irregularity of the circulation in the chest or in the brain. It has been traced backward to plethora, posture, heavy suppers; and forward as a prognostic of heart disease or hydrothorax. It differs from ordinary dreams in possessing always the same characteristic of fear of some object in contact with the body, in a recognized inability to move or speak while there is a strong desire to do both, and in

the presence of a semi-consciousness of the real source of the apprehension. The affection is recorded to have been epidemic; and modern instances have occurred where large communities have been agitated by night panics. A regiment of French soldiers, quartered in a ruined monastery, were awakened, at the same hour in two successive nights, by a black dog leaping on the breast of each. These veteran warriors, inured to danger, inaccessible to superstition, could not be prevailed on to make a third trial. Such frightful impressions may occur during the day, and during mere somnolency or drowsiness, but usually at the moment of awakening during the night. The time, the distinct recollection of the circumstance, and the bodily perturbation which remained when consciousness was re-established, all conspired to convert these visions into the objective hobgoblins, the omens and supernatural revelations of past ages, and which still linger as matter of belief where the temperament or situation of the individual resemble those of by-gone generations. In a very large number of instances such dreams represent, or are continuations of, the previous waking thoughts and emotions. They are so far voluntary that indigestible food or excess may induce them. Fuseli, for artistic purposes, created 'chimeras dire' in sleep by supping on pork chops.

NIGHTSHADE: English name of certain plants of nat. order *Solanaceæ* (q.v.), possessing the narcotic properties frequently developed in that order. Among them are some

Common or Black Nightshade (*Solanum nigrum*).

species of *Solanum* (q.v.), particularly the COMMON N., or BLACK N. (*S. nigrum*), an annual or biennial, with erect angular stem, ovate, sinuate-dentate leaves, drooping lateral

umbels of white flowers, and globose black berries; a frequent weed in waste places in most parts of the world. Few plants are more widely diffused. It is only slightly narcotic. The leaves, in a fresh state, are said to be injurious to animals which eat them, but seem to lose almost all narcotic property by boiling, and are used as spinach, particularly in warm climates. The berries, though generally dreaded or suspected, may also, it is said, be eaten, at least in moderate quantity, without danger. They contain, however, the alkaloid *Solanine*, found also in the shoots of the potato.—For WOODY N., see BITTER-SWEET. For DEADLY N., see BELLADONNA. For ENCHANTER'S N., see CIRCÆA.

NIGRESCENT, a. *nī-grĕs'ĕnt* [L. *nigrescens* or *nigrescen'tem*, growing black—from *niger*, black]: growing dark or black; approaching to blackness.

NIHIL, n. *nī'hĭl* [L.]: nothing. NIHILISM, n. *nī'hĭl-ĭzm*, nothingness: in philosophy, the doctrine that nothing can be known: term applied to certain so-called philosophic systems of 'negative tendency,' which deny God, the soul of man, and the moral distinction of good and evil. It is cognate to the nihilism which characterizes an extreme socialist sect of Russia, whose chief maxim is, that every social institution which now exists must be destroyed to clear the way for a perfectly new state of society, and which advocates the assassination of kings and rulers as one of the means to that end (see below). NIHILITY, n. *nī-hĭl'ĭ-tĭ*, nothingness; state of being nothing. NIL, n. *nĭl*, a contraction of *nihil*, nothing; a term in book-keeping cancelling, passing it over, taking no notice of it.

NIHIL CAPIAT PER BREVE, phrase [Lat. that he take nothing by his writ]: in *law*, the judgment given against the plaintiff in an action, either in bar thereof, or in abatement of the writ.

NIHIL (or NIL) DEBET, phrase [Lat. he owes nothing]: in *law*, a plea denying a debt.

NIHIL (or NIL) DICIT, phrase [Lat. he says nothing]: in *law*, a judgment by *nihil dicit* is when the defendant makes no answer.

NIHIL HABUIT IN TENEMENTIS, phrase [Lat. he had nothing in the tenement or holding]: in *law*, a plea to be made in an action of debt only, brought by a lessor against a lessee for years, or at will without deed.

NIHILISM.

NIHILISM, *nī'hĭl-ĭzm*, in Sociology: the doctrine of destruction to all existing institutions, as preparatory to some indefinite and spontaneous readjustment of society on the basis of absolute individual freedom. By some recent anarchists it is asserted to be not a doctrine or system, but simply a condition precedent to a true system, which is *anarchy*—this word being used to signify, not chaos, but an order of things that excludes all idea of external government, and depends on individual self-control and voluntary co-operation. But, while the words [*nil*, nothing; and *a*, without, *archē*, government] might justify the distinction, there has been in fact no essential difference between nihilists and anarchists. The former term—introduced by Turgenieff—has been applied most often to the revolutionists in Russia, and is associated mostly with a peculiar condition and heterogeneous opinions there. The doctrines of Michael Bakunin (1814–72), who is called the Father of Nihilism, are just as definite as those of recent anarchism, are substantially identical with them, and are diligently republished by American and European anarchists. Hertzen has been spoken of as the founder of doctrinary, Bakunin of militant, and Tchernysehevsky of scientific nihilism. In 1848, Hertzen said, 'Death to the old world! Life to chaos, destruction! Room for the Future!' and he denounced socialism; but the emancipation of the Russian serfs 1857 made him an opportunist, i.e., one who accepts, in place of immediate destruction, all openings and gradual advances toward the ideal freedom. Tchernyschevsky was a socialist, rather than a nihilist; socialism would make government everything, instead of abolishing it forever, though it might entertain the idea of temporary abolition as a step to its end. The roots of N. in Russia reach back to the Western-European atheism of the 18th c. and the French Revolution. Its rise had some connection with German philosophy, especially Hegelianism, which, though susceptible of extremely different interpretations, undoubtedly tended, in many minds, to unsettle faith as well as to stimulate speculative thought. Bakunin, while rejecting all ideal philosophy, speaks in the style of Hegel, saying that 'every development necessarily implies a negation of its base or point of departure.' Radical writers on political economy, chiefly Proudhon, contributed to the intellectual movement—also the pessimists led by Schopenhauer; but not least the materialists, such as Büchner and Feuerbach. Bakunin begins his discussion of God and the state, by asserting that humanity is nothing but the highest manifestation of animality; that our first ancestors were ferocious beasts, endowed in a higher degree than other animals with the power to think and the desire to rebel—in other words, to seek liberty. These two powers create all that constitutes humanity, representing together the negative power in the positive development of human animality. Man became man by an act of disobedience and science. He passed out of animal slavery, and is passing out of a divine slavery; if God is, man is a slave. There is no authority, except that

of the natural laws within us; there can be no liberty under any external authority and legislation; even in republics a political oligarchy is formed. Science, as representing natural law, is authority, but no *savant* is, nor learned academy; science is an authority of fact, not of right; every authority of right becomes an oppression and a falsehood. The only exception, besides that already made, is the collective and public spirit of a society founded on the mutual respect of all its members. 'Materialism,' says Bakunin, 'denies free will and ends in the establishment of liberty; idealism, in the name of human dignity, proclaims free will, and on the ruins of every liberty founds authority. Materialism rejects the principle of authority, because it rightly considers it the corollary of animality; and because, on the contrary, the triumph of humanity, the object and chief significance of history, can be realized only through liberty.' But he inveighs against the idealization of humanity itself—that is, doubtless, by those who make it their God, their religion, their only immortality; it is real and living only in really living men; we have to consider only existing flesh, bone, and brain. Such is his philosophy. He avowed himself a materialist and an atheist. Although he called himself a revolutionary socialist, he was an individualist *versus* all government, but, for a time, if not to the end of his life, was a collectivist, favoring a central directive power in the production and distribution for the benefit of all; this falls short of the elaborate governmental scheme of socialism proper. Indeed, in 1867, he said he was not a socialist, and that he abhorred communism as the negative of all liberty. In his speech at Geneva, 1868, he proclaimed no right but might, and one's own happiness one's only law. As he was the chief apostle of N., its prevailing doctrines in Russia may be considered as fairly well represented by him. A proclamation put forth five years after his death, demanding simply a representative democracy, with parliaments, and certain reforms, cannot be regarded as nihilistic; if it were such in its source, it may have been an artifice or temporary expedient. A nihilist paper issued 1865 at Heidelberg by Russian students expelled from their own colleges, had for its motto, 'I spit on all comers;' this seems to be explained by the avowal of a nihilist: 'Take the earth and heaven, church and state, take kings and Deity, and spit on them—that's our doctrine.' Students have formed a large quota of Russian revolutionists, a fact due not only to youthful enthusiasm and the reading of radical literature, but also to the materialistic perversions of science and to the maladministration of Russian colleges. Young women, both students and others, have partaken of the movement, and carried it to extreme enthusiasm; in Tchernyschevsky's novel, *What is to be Done?* they found a new model of woman, one who frees herself from the bonds of society, adopts masculine habits, and is independent even to the extent of platonic marriage. Besides students, the revolt includes more or less of the aristocracy, government employees, traders, and soldiers. In many, the materialist

millennium has become a kind of religion; they give up wealth and position, adopt the garb of laborers, and share the toils and miseries of artisans. Hence some have regarded the extreme enthusiasm as an epidemic hysteria. But the grinding injustice of governmental administration in Russia, the insecurity of even the innocent against informers and omnipresent spies, the farcical trials, the terrible blows of death or exile falling on relatives and friends accused of political offenses—these account for the peculiar bitterness and desperation of Russian anarchism, while the revolutionary movement as such is but a concomitant of the general progress in the civilized world. The Slavonic temperament and oriental element can hardly be considered as factors of much account. The peasantry of Russia have no sympathy with N.; though taxed unmercifully, often, by the eldership of the village commune, elected by themselves—an election so managed that it may be but an empty form; and though frequently living in squalor and receiving but the amount of eight or ten dollars wages a month, they adore Russia and the Czar. They would prefer to be governed and taxed directly by the imperial government, which now governs them only through the corrupt communes. The peasantry is an immovable obstacle in the way of N., besides other insurmountable barriers. It is not wonderful, therefore, that N., since its period of startling activity from a time soon after the emancipation of the serfs in 1857, till about 1885, seems to have degenerated into a sort of *vendetta*—a life for a life; and so lives on as an occasional and futile local outbreak, accompanying a world-wide debate on public questions, especially the really serious and growing problems of capital and labor. Should these problems be everywhere measurably solved by the establishment and greater purity of representative government, by wise legislation, and especially by the prevalence of profit-sharing and co-operative labor; should building-loan associations continue to flourish, endowing the poor with homes; and should the strong reaction which has now set in against materialism and its selfish, utilitarian ethics become general—it is safe to say that anarchism as a violent revolt has had its little day. Nowhere, to-day, are the masses in sympathy with it; they care not for its theory of extreme individualism, and reject its intemperate words and methods. Besides, the only kernel of truth in it has been and is becoming realized insensibly more and more—namely, that as men grow more enlightened and elevated, they are a law unto themselves, and even their obedience to lawful authority is free. This was clearly announced by Christianity, which further speaks of a time when Christ shall have put down all rule and authority and power. There are even some, now, who claim to be Christian anarchists, and refer to the writings of the apostle Paul as good anarchism. Correspondingly with the Pauline doctrine and with modern progress, external government will in time be reduced to a minimum, and voluntary association tend, as it already does, to a maximum.

With this sketch of the subject, it should be noted that of late N. or anarchism has sought to identify itself with evolution. It would regard society as an aggregate of organisms trying to combine the welfare of the individual and the species; there is a tendency to aggregates and to the progressive adaptation of these to surroundings. It quotes Herbert Spencer as saying that society marches toward the identification of altruism with egoism, and that organisms are so adjusted that energy expended for the general welfare checks that which is expended for the individual, and subordinates it so as to leave to individual welfare no greater part than is necessary to the maintenance of individual life. This seems, however, to favor extreme organized state socialism, though advocated by Prince Krapotkin, whose hope is in decentralization and free communism. Incidentally, he brings in evolution as founding moral science on the social needs and habits of mankind. And he finds corroboration of his doctrines in Bain's theory of moral habits; Guyau's morality without obligation or sanction, and in researches like Lubbock's in respect to animal societies.

The economics of anarchism, as lately elaborated, seem to pivot on free land and free mutual banking, individual or associated, the issues to be 'divisible receipts' representing the actual property of the individual or the company, and mutually received by widely organized agreements—this system being equivalent to Proudhon's national one of generalized bills of exchange in place of any currency proper, whether paper or coin; this would abolish money monopoly and interest, and give free capital, free exchange, and, with exemption from all taxation, free labor. It is not enough to make land free to occupancy and use. The monopoly of exchange and credit is worse than land monopoly; 'it carries with it privileged capital, extortion of interest, the struggle of profits, the greater part of the necessity for taxation and the prime cause for labor exploitation.' (D. D. Lum.)

As to incidents in the history of N., the following may be mentioned: 1859, societies in the agricultural college at Petrovski, where, 14 years later, a false emissary of Bakunin was assassinated, and the assassin implicated 183 persons, of whom 99 were sent to Siberia 1877; 1864, Tchernyschevsky exiled to Siberia; 1867, the Czar shot at when riding with Napoleon III. in the Bois de Boulogne—same year, Bakunin formed the International Alliance of Socialistic Democracy; 1869, students' demonstrations and manifestoes; 1871, trials and many exiled; 1875, rising of students, with red flag, at Kazan; 1876, a Nihilist proclamation on its way to Russia seized at Königsberg; 1878, chief of police Mezentzoff assassinated; same year, Vera Sassulitch tried for killing another chief, Trepoff, and acquitted by jury, since which such cases have been tried by court-martial; same year assemblages of the people prohibited, and a socialistic pamphlet circulated advising the *lex talionis* policy; 1879, Prince Krapotchkin, gov. of Kharkov, shot, also a commander of gendarmerie at Kiev, and others

—many incendiary fires—an explosion in the winter palace —April 2, Solovieff shot at the Czar—a train of cars for Moscow blown up, but the emperor had taken another train; 1881, the Czar killed; 1882, the public prosecutor at Kiev assassinated, and a mine discovered under the Moscow cathedral, where the coronation of the new emperor was to occur; same year, anti-terrorist societies were formed; 1883, many arrests tended to subdue conspiracies, and one noteworthy murder took place—a lieut. col. of the St. Petersburg gendarmerie by a revolutionist; 1884, political assassinations in Odessa, the Univ. of Kiev closed after arrest of 168 students, and many trials of military officers; 1885, a noted prosecution of officials and other persons of high position, at Warsaw; 1887, a constitutionalist conspiracy of wide extent disclosed, several attempts to kill the Czar defeated, and the woman's college at St. Petersburg closed; 1888, students' riots on account of oppressive regulations, and some universities closed; 1889, a Nihilist leader pardoned on public abjuration, while a refugee in Switzerland, where a new plot against the Czar came to light; and, in place of a common revolutionary effort, traces were found of various societies with various objects and methods.—'*Stepniak*,' transl. from It. 1883, gives account of the origin and aims of Nihilism. See COMMUNISM: SOCIALISM: INTERNATIONAL, THE.

NIHILISM, in Philosophy; or NON-SUBSTANTIALISM: doctrine that the phenomenal universe, whether matter or mind, can be resolved in ultimate analysis to nothingness —'mere appearances with no credible substratum of reality.' To borrow phrases from the French assembly, philosophical nihilism is the extreme right, and pantheism the extreme left, of philosophy, while idealism is the right centre and materialism the left centre. The designation, philosophical nihilists, is applicable not only to the directly dogmatic, but also to those who make nihilism the ultimate issue of all reasonings about existence that do not begin with some *a priori* postulate. Between the centres, above mentioned, place should be found for dualism, affirming both matter and mind, and monism, which identifies the two, but has no more philosophical basis than materialism. See IDEA, and references thereunder.

NIIGATA, *nē-ē-gâ'ta:* city of Japan, lat. 37° 57′ N., and long. 139° E., on the W. part of the island of Nippon, the principal city of the province of Echigo, and one of the first ports opened to foreigners. N. covers about one sq. m. of sandy ground, and has numerous canals communicating with the Shinano river, upon which it borders. There is a college founded 1870; a hospital, and several public gardens. There is a large trade with the inland regions, and considerable traffic by way of the sea, though the latter is greatly curtailed by a bar at the mouth of the river. Climate in winter is severe. Pop. (1898) 53,366.

NIJM'FGEN: see NIM'EGUEN.

NIJNI-NOVGOROD.

NIJNI-NOVGOROD, *nĭzh'nē-nŏv-gō-rŏd':* important government in the e. of Great Russia, between the governments of Vladimir on the w. and Kazan and Simbirsk on the e.; 19,390 sq.m. (according to the *Almanach de Gotha*). The surface is divided into two distinct portions by the Volga with its tributary the Oka. On the left, the n. bank of the river, the surface is flat; on the right bank it is hilly. As the climate is severe, the soil is not very fertile, and there are few rich meadow-lands. There are many obstacles to agriculture, which, however, is the chief occupation. The inhabitants are engaged much also in petty manufactures, in which the peasantry have made noticeable progress; thus cutlery employs over 6,000 families in Pavlovo and Vorsma. The chief rivers are the Volga, Oka, and their numerous tributaries. There is communication by water with 24 governments, and with the Baltic, the White, and the Caspian seas. The n. districts abound in forests; and here wooden utensils and tools are manufactured. There are several large iron-works, and the town of Gorbatof is the Sheffield of its district. Leather, especially the variety called Russian leather, is largely manufactured, and sheep and lamb skin dressings is a staple employment. On the right bank of the Oka are several ship-building and dock yards. The towns and villages are filled with an industrious and thriving manufacturing population. The people belong mostly to the Greek Church. Education is at a low stage. Capital, Nijni-Novgorod (q.v.). Pop. 1,600,300.

NIJ'NI-NOVGOROD' (Lower Novgorod), or simply NIJ'NI: famous commercial and manufacturing town in the e. of Great Russia, capital of the government of Novgorod; at the confluence of the Oka with the Volga, 715 m. e.s.e. of St. Petersburg, 276 m. by rail e. of Moscow. The fortified portion of the town occupies a hill overlooking the Volga, and is surrounded with a wall. It contains the Kreml or citadel, two cathedrals, and the palaces of the governors. The manufactures include cloth, leather, steel goods, wax candles, tobacco, beer, pottery, etc., and ship-building. The trade of the town is of great importance, especially during the great annual fair which brings buyers and sellers from all climes between Germany and China. For the convenience of those frequenting the fairs, an enormous market-hall has been built, and 60 blocks of buildings for booths, containing 2,530 apartments separated by fire-proof walls. The numerous churches of the citizens are supplemented by a mosque and an Armenian church for the visitors. There are three annual fairs, two of them of minor account. The third, beginning at the end of July and continuing into September, is by far the greatest in the world. The normal population is then increased to nearly 350,000; and the value of the goods sold at the great fair annually is about $125,000,000.

N., founded 1221, was devastated on several occasions

by the Tartars; and 1612, when it was on the point of falling a prey to Poland, Minin, the famous butcher of N., collected an armed force here, which, under Prince Pojarsky, drove the invaders from the capital: see Moscow. The prosperity of this town dates from 1817, when the great fair was removed to N. from Makarief, on account of the destructive fire in the latter place. Pop. of N. about 95,100.

NIJNI-TAGILSK, *nĭzh'nē-tâ-ghĭlsk'*: town of Russia, govt. of Perm, amid the Ural Mountains, 150 m. e. of Perm. It is one of the most important mining towns in the world. The soil in the immediate vicinity is everywhere rich in iron, copper, gold, and platina; not far off is the famous magnetic mountain Blagodat, 1,422 ft. high. Akimfi Demidoff (q.v.) established the first foundry here 1725. The yield both of iron and copper is immensely large. Pop. 30,000.

NIKE, *nī'kē*, in Greek mythology, the goddess of victory: called by the Romans Victoria. In art she is generally represented as a winged female figure. Her attributes are a palm branch, a garland and sometimes a herald's staff.

NIKE APTEROS, or ATHENE NIKE, a small but beautiful Doric temple standing on a bastion flanking the entrance to the Athenian Acropolis. It was torn down by the Turks in the 17th century.

NIKISCH, *nē'kĭsh*, ARTHUR, Hungarian orchestral conductor: b. Szentmiklos, Hungary, 12 Oct. 1855. He studied violin, composition and piano under Hellmesberger, Dessoff, and Schenner, respectively, in the Vienna Conservatory; was first violin in the Vienna Royal Opera orchestra for a year; and then in 1878 became musical director of the City Theatre of Leipsic. He directed the Boston Symphony Orchestra 1889–93, the Royal Hungarian Opera in Budapest 1893–5, and the Philharmonic concerts in Leipsic from that date up to the present. In Leipsic he conducts the famous Gewandhaus concerts. Nikisch wrote 'Die Christnacht,' and other music. Consult the study by Pfohl (1900).

NIKKO: one of the holy places of Japan, on the mountains of the same name (meaning the sun's brightness); about 95 m. n. of Tokio. It is the seat of a temple of unknown antiquity, and of a Buddhist temple founded 767, and contains the tomb of Tokugawa Iyeyasu, who founded the great military dynasty which held sway 1603–1867, and who was the most illustrious figure in the history of the empire. It contains also a great number of temples, shrines, and monuments, some of which are magnificently decorated. For hundreds of years it has been the resort of multitudes of pilgrims, and the mikado annually sent an envoy to pay respect to the mighty dead. Its natural attractions and artistic treasures combine to make it the most remarkable place in the country, and a favorite resort of travellers. The Kiri-furi falls, 700 ft. in height, are about seven m. distant.

NIKOLAEF, *nē-kō-lâ'ĕf:* town of s. Russia, govt. of Kherson, 40 m. n.w. of the town of Kherson; at the head of the estuary of the Bug, at the confluence of that river with the Ingul; 42 m. from the Black Sea. It was founded 1790, and its situation was so convenient for ship-building that it soon became the centre of the naval administration of the Black Sea. It has broad straight streets, contains several barracks, a cathedral, schools for pilots, hospitals, an observatory, and an arsenal. In the first half of the 19th c., about 10,000 men were employed at N. in ship-building and other naval operations. Since the opening of the railway system, by which it has connection with Moscow, etc., pop. and trade, especially the grain exports, have greatly increased. The disadvantage of the location is that the bar has only 18 to 21 ft. of water, so that fully armored ships are unable to pass it. Pop. 92,060, 45 per cent. milit., and 7,000 Jews.

NIKOLAEVSK, *nē-kō-lâ'ĕvsk:* chief town of the Amur territory, in e. Siberia, on a well-wooded plateau on the left bank of the Amur, 22 m. from its mouth, 6,750 m. e. of St. Petersburg. The approaches to the town are defended by four batteries. The Amur is here a mile and a quarter broad, but the landing-place is available only for small craft, all large vessels being compelled to lie in midstream. N. was founded 1851; in 1855, it consisted of 150 houses, and 1858, of 249 houses. It is the seat of naval and civil administration, and the centre of the commercial activity of the district. It is a station on the Siberian-American telegraph. Pop. 12,500.

NIKOLSBURG, *nē'kōlss-bûrch*, or MIKULOV, *mē'kôlŏv:* town of Austria, in s. Moravia, 27 m. s. of Brunn, at the foot of the Pollaver Hills, famous for their rich red wines. The town belongs to the princely family of Dietrichstein. It has several steam mills, and cotton and silk factories. In the middle of the town, upon a rock stands the castle of the Dietrichsteins, with a library of 20,000 vols., and a vat in the cellars capable of containing 2,000 eimers (more than 30,000 gallons). Pop. 8,100, of whom more than half are Jews.

NIKON, *nē'kŏn:* patriarch and reformer of the Russian Church: 1605–1681. His parents were in lowly circumstances, living not far from Nijni-Novgorod, and he was educated by a monk. While a recluse in the hermitage of Anserche, the enmity of a fellow-monk, whom he found to be dishonest, drove him to seek a new retreat, and he founded a monastery on the island of Kj at the mouth of the Onega river. Later, he visited Moscow, and by Czar Alexis Micailov was placed at the head of the Novaspasky convent in that city; 1648 he became metropolitan, and four years later succeeded the patriarch Joseph. Under him a council was convened to revise the Slavonic Scriptures, 1654. The publication of this revision, and his efforts to reform ecclesiastical abuses, intensified a conservative opposition to him connected with social and political changes. Luxury, and political ambition on the part of some leading nobles, were regarded as Polish innovations; and the church and its dignitaries were accused of similar tendencies. The opposition gathered to itself all who were for the old order against centralization in church and state, and hence against all changes. It rose to the degree of fanaticism; and insurrections followed, attended by severe imperial persecutions; and the ultimate result in the church was reactionary and degrading. But Nikon, except it were in hierarchical notions, was a reformer, and a man of practical piety. From the churches, he removed pictures that were idolized; he sought to promote temperance and education; he brought about by his example and encouragement a practical reform in preaching, and he was devoted to every charitable work. His enemies, however, prevailed with the Czar against him. Retiring to his monastery and refusing to return, he was deposed from the patriarchate 1667. He lies buried in the monastery of the 'Resurrection of Christ.' A collection of chronicles down to 1630, made by him, is known by the title *Chronicles of Nikon.* Among his writings are a book of prayers, a scheme of dogmatic studies, and *The Intellectual Paradise* —a description of the monasteries of Mount Athos and Valdi. By his enterprise 500 Greek books of the 11th to 17th c. were brought from the East. Printing presses were established, and Greek and Latin were introduced into Russian schools. The Russian patriarchate began 1592 and was abolished 1781.

NIKOPOL, *nē-kō'pōl:* thriving town of s. Russia, govt. of Ekaterinoslav, on the right bank of the Dnieper, about 200 m. from its mouth, lat. 47° 33′ n. N. is the centre of an extensive agricultural district, the produce of which is shipped to Odessa. Between N. and the port of Odessa, there is regular communication by steam-boat. Pop. about 10,000.

NIKOSIA, *nē-kō-sē'â:* capital of Cyprus: see LEFKOSIA.

NILE, *nīl* (*Nilus*), called by the Egyptians, *Hapi Mu* (genius of the waters), and by the Hebrews *Sihor* (the black): great river of n.e. Africa formed by the union of the Bahr-el-Abiad (the White or True Nile) and the Bahr-el-Azrek (Blue Nile). Captains Speke and Grant discovered that the first of these, the true N., flowed out of the enormous Victoria Nyanza, a lake about 200 m. in diameter, from about lat. 0° 20′ n., to 2° 48° s., and from long. 31° 40′ to 35° e., about 4,000 ft. above sea-level; and the river Shimiyu, the largest tributary of this lake, flowing into its southern extremity, must now, according to Stanley (1875), be regarded as the most southerly and remotest upper stream of the N., having its source only about 300 m. w. of the Indian Ocean. Some recent travellers, however, find the upper Nile stream in the Kagera river (Alexandra Nile of Stanley), navigable about 50 m. from its entrance into the Victoria Nyanza, on its w. shore, and believed to rise 200 or 300 m. s.w. The second, the Blue Nile, has its source in Abyssinia, lat. 10° 59′ n., long. 36° 55′ e.

The White N., from its outfall from the Victoria Nyanza at the 'Ripon Falls,' lat. 0° 20′ n., long. 33° 30′ e., flows n.w. and w. about 230 m., till it enters the Albert Nyanza (q.v.) within 30 m. of its n. extremity, where the river again emerges. Issuing from the Victoria Nyanza, the N., dropping about 12 ft. over the rocks, with a width of about 400 ft., rushes down north like a mountain-torrent, running off at last into long flats, and expanding so as to form what is called Ibrahim Pasha Lake. In this part of its course the river is navigable, and continues to be so until it reaches the Karuma Falls. From these falls to the Murchison Falls (120 ft. in height, 25 m. above its entrance into the Albert Nyanza) the river forms a series of rapids. Between the two Nyanzas the N. is known as the Victoria N., or Somerset river.

After leaving the Albert Nyanza, the N. begins its n. course to the Mediterranean, and has no further lake expansion. Between the Albert Nyanza and Gondokoro (Ismailia), in 4° 55′ n. lat., 31° 51′ e. long., 1,500 ft. above the sea, the N. river descends several hundred ft. in a series of rapids and cataracts. For about 500 m. after Gondokoro, the N. flows very tortuously, first n.w., and then n.e.; and is joined, about lat. 9° 15′ n., long. 30° e., by its first great affluent, the Bahr-el-Gazal, which joins the Nile from the w. with hardly any perceptible current. The second tributary is the Giraffe river, about one-third the volume of the N. at its point of junction, long. 31° e. From the Bahr-el-Gazal the N. flows due e. about 80 m., then s. 30 m., when it is joined by its third tributary, the Sobat river, from the e. The Sobat is full and navigable. Between this and the town of Khartoum, about 460 m., the N. flows n. with width of one to two m., and is joined by several streams from the e. side.

Khartoum, cap. of Nubia, is at the confluence of the Bahr-el-Azrek (Blue N.) and the Bahr-el-Abiad (White or True N.), 1,188 ft. above sea-level, lat. 15° 35′ n., long. 32°

ROMAN RUINS, ISLE OF ELEPHANTINE, ON THE NILE.

30′ e. The Bahr-el-Azrek, long supposed to be the main stream of the True Nile, is formed by the junction of the Abai and the Blue river. The Abai has its source in Abyssinia, 50 m. from Lake Dembea, which it enters from the s.w.; emerging on the s.e. of the lake, it flows about 90 m. s.e., then describes a semicircle round the peninsula of Godjam, and continues n.w. about 150 m. It is here joined by the Blue river from the s., and from this point the Blue N. flows n.w. to Khartoum, receiving from the e. two large rivers running nearly parallel to each other, the Dender and the Rahad or Shimfa. From Khartoum, the united stream flows n. about 60 m., passing the town of Halfaia and the ruins of Meroë to the first cataract, and thence n.e. past Shendy (q.v.) to its junction with the Atbara, which enters the N. at El Damer, lat. 17° 45′ n., long. 34° east.

The Atbara, called also Bahr-el-Aswad, or Black river, because it carries down with it the greatest amount of the black mud and slime that manures and fertilizes Egypt, is the last tributary received by the Nile. The Goang seems to be the direct source of the Atbara. It rises in the heights n. of Lake Dembea. About 150 m. from its source it receive the Basalam river, and about 30 m. further on, the Takazze or Setit river, both from the e. The Takazze has a far greater volume of water than either of the preceding rivers. It rises in the Samen Mountains, round which it flows first e., then n., till in about lat. 13° 30′ n., long. 38° 50′ e. it turns n.w., and then almost due w. joining the Atbara at right angles.

From its junction with the Atbara, the N. continues to flow n. through the populous and fertile district of Berber, full of villages; and then enters the desert. Turning w. in lat. 19° n., it forms the large island of Mograt, and makes a curve to the s.w., known as the 'great bend,' in which are two cataracts. Entering Nubia, the Nile resumes its n.w. course, with narrow strips of cultivated land on each bank. Here it forms another cataract, and bends round to the n.e. with a fifth cataract, lat. 21° 40′ n. After this the valley of the N. narrows, and at Assouan it forms the last cataract in descending. The great dam at this place was opened with much official ceremony, 1902, Dec. 10.

From Assouan to the sea, the average fall of the N. is two inches to a m., and its mean velocity about three m. an hour. It waters and fertilizes the whole length of the land of Egypt. The delta of the N. extends from lat. 30° 10′ n. to 31° 30′ n., and has a base on the Mediterranean of about 150 m. In it the N. spreads out into numerous streams, the two principal being those of Rosetta and Damietta. The total length of the Nile, from its exit from the lake to the sea, is about 3,300 m. measured along its course, or 2,200 m. direct distance. If, beyond Victoria Nyanza, the Shimiyu be taken as the upper stream of the N., the total length is about 3,800 m., and direct distance 2,600 miles.

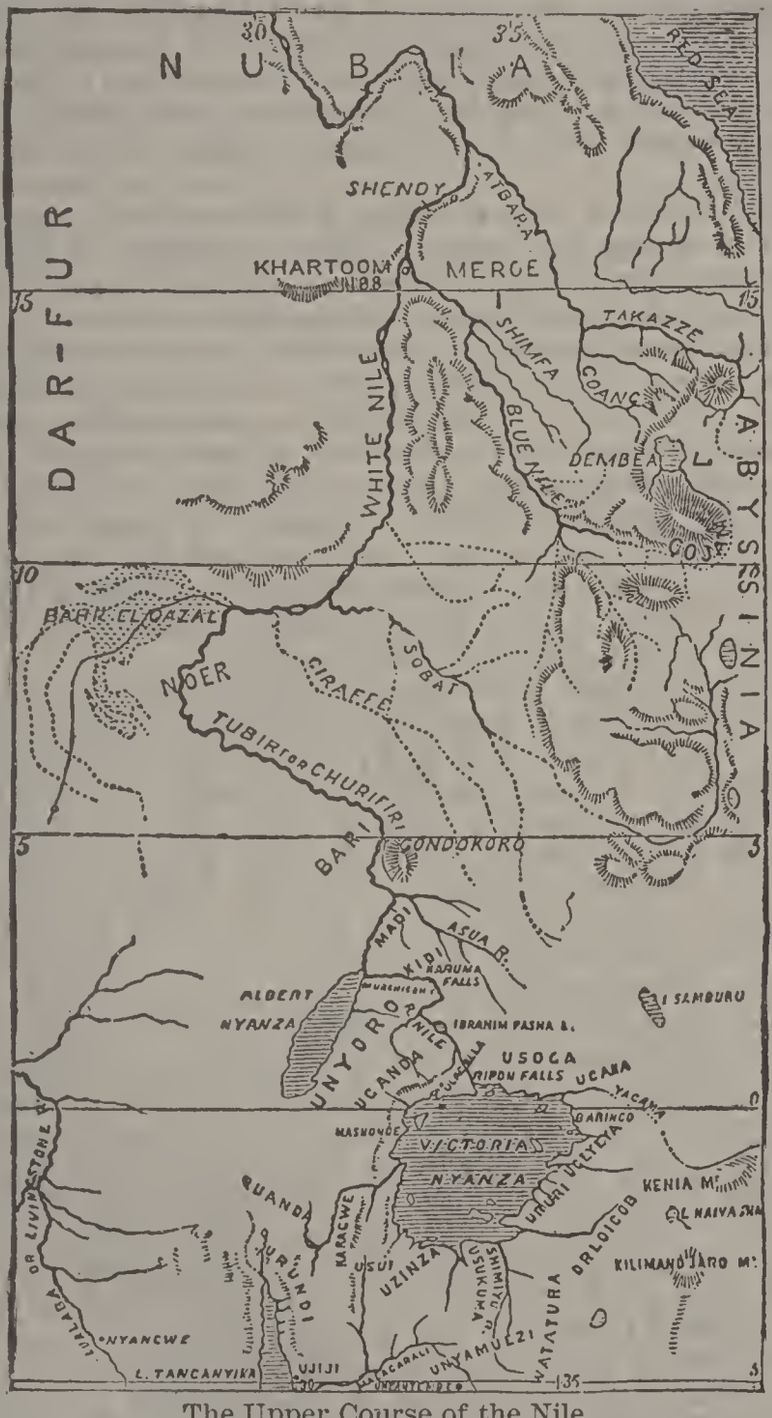
A feature peculiar to the river of Egypt is, that from its

junction with the Atbara, to its mouth, more than 1,500 m., it receives no affluent whatever, and yet it is able to contend with the burning sun, and scarcely less burning sands of Nubia. With the ancient Egyptians the river was held sacred: the god Nilus was one of the lesser divinities. Its annual overflow is one of the greatest marvels in the physical geography of the globe, for it has risen to within a few hours of the same time, and to within a few ft.—usually a few inches—of the same height, year after year for unknown ages. At Khartoum it begins to increase early in April, but in lower Egypt the inundation usually begins about June 25, and attains its height in three months. It remains stationary about 12 days, and then subsides. The cultivable soil of Egypt is dependent wholly on the rise of the N., and its failure would cause a dearth; for, virtually, the country has no rain. Continuous south-wind brings a good, and north-wind a bad year. During a good inundation, the rise is about 40 ft. on the Tropic of Capricorn, 36 ft. at Thebes, and 4 ft. at the Damietta and Rosetta mouths in the Delta. If at Cairo the rise is only 18 or 20 ft., there is a scarcity; up to 24 ft., a deficiency; 25 to 27 ft. is good: more than that causes a flood, and fosters plague and murrain. During the inundation, the whole valley is covered with water, from which the villages rise like Islands, protected by dikes. Of late years the overflow has been greater than the average of many centuries. The rise and fall of the trunk stream of the lower N. is owing to the periodicity of the rains on the mountains of Abyssinia and in the basin of the Victoria Nyanza, where, on the equator, it rains, more or less, all the year round, most copiously during the equinoxes. See NILOMETER. The banks of the N. swarm with birds, among which are vultures, cormorants, geese, pelicans, quails, and the white ibis; and its sweet, soft waters teem with fish. The average amount of alluvium brought down by the river is estimated at a deposit of 4½ inches in a century—by some, it is made as high as 6 inches; the greater part of it is brought down by the Atbara.

The question of the source of the N. is at once the oldest and the most recent of geography. That the sources of a river, at whose mouth one of the earliest and most civilized peoples was established, should have been so long veiled in obscurity, is unparalleled in geographical research. The want of success in exploring the upper basin of the N. may be attributed to the great length of the river, to the difficulties which beset the traveller in the physical nature of the countries that he must pass through, the climate: and the jealousy, ignorance, and barbarism of the native tribes. This problem of centuries may now be regarded as satisfactorily solved; for the question, whether there may not yet be found important feeders of the White Nile carrying back its source to a still greater distance in the interior, is practically excluded by Stanley's exploration of the Lualaba or Congo basin. The journeys of Krapf and Rebmann to the foot of Kilimanjaro and the other snowy mountains in e. Africa, believed by them to be the ancient 'Mountains of the Moon,' and the explorations of the White N., pointed to

the conclusion that it was among these mountains that the sources of the great river would ultimately be discovered.

There was, however, another theory. Rumors gathered from the natives pointed to lakes in the regions s. of the equator, as the true sources of the N. To explore this country, the distinguished traveller Capt. Richard Burton, accompanied by Capt. Speke, started from the Zanzibar coast 1857. Their



The Upper Course of the Nile.

enterprise was so far successful that they discovered Lake Tanganyika, lat. 5° s., long. 36° e., and a large crescent-shaped mass of mountains, overhanging the n. half of the lake and 10,000 ft. high, considered by Capt. Speke the true Mountains of the Moon. On the shores of Lake Tanganyika, Burton was laid up by illness, and his companion, after sur-

veying the n. portion of the lake, left him there to recruit his health, while he (Speke) proceeded n. to discover another huge 'nyanza' or lake, of which he was informed by the natives. This he accomplished 1858, Aug. 3, when he discovered the s. end of the Victoria Nyanza (q.v.). In his journal he says of this immense sheet of water: 'I no longer felt any doubt that the lake at my feet gave birth to that interesting river, the source of which has been the subject of so much speculation, and the object of so many explorers.' Certainly its vastness gives it prominence as the great reservoir of the mighty N.; but the head water of the river is rather one of the streams which empty into the Nyanza.

In 1861, Capt. Speke, taking with him Capt. Grant, returned to the lake region. The expedition approached Victoria Nyanza again from the coast of Zanzibar; and the first place from which they obtained a view of it, during the second expedition, was the town of Mashonde on its w. side. Thence they pursued their way along the shore northward. Crossing the equator, they reached streams which are said to flow out of the lake, and further on, in the centre of its n. coast, what they considered to be the parent stream of the Nile, 150 yards in breadth, flowing over rocks of an igneous character, and forming falls 12 ft. high, which Capt. Speke christened 'Ripon Falls,' in honor of Earl de Grey and Ripon, pres. of the Royal Geog. Soc. at the start of the expedition.

In the kingdom of Karagwé, Capt. Speke found a very superior negro race, much better disposed to strangers than any of the tribes that he had formerly met. The country occupied by this race, and that of Uganda, stretches along the Nyanza, and covers half of its w. and n. shores, the Uganda being bounded e. by the main stream of the Nile. N. of it lies the kingdom of Unyoro, where the dialects belonging to the language of s. Africa, and which up to this point are used by the various tribes, suddenly cease, and give place to those of the language of n. Africa.

At Gondokoro, Speke and Grant were met by Mr. (now Sir Samuel) Baker, who had come from Cairo to their relief. Baker, accompanied by his heroic wife, pushed still southward, and had the happiness of discovering, 1864, another great lake, which he called the Albert Nyanza. In 1869, he undertook for the Khedive of Egypt a great military expedition, to suppress slavery in the upper regions of the Nile; and reduced under the sway of that ruler the whole valley of the river as far as the Victoria Nyanza. See BAKER: GORDON: also EGYPT: SUDAN.

Meanwhile, Dr. Livingstone had been working for many years, from another quarter, at the solution of the great African problem—the true source of the Nile. In 1866, he began the great journey from which he was destined never to return. Starting from the Rovuma river, in the far south, he passed round the s. end of what was called 'Lake Nyassa,' proceeded n. exploring the lakes Bangweolo and Moero; and 1869 reached Lake Tanganyika, now known to send its outflow toward the Congo, but which he sought

in vain to connect with Victoria Nyanza. In 1871, he was found by Stanley at Ujiji, on Lake Tanganyika, and it was then his opinion that neither Tanganyika nor Albert Nyanza nor Victoria Nyanza was the source of the Nile, nor any of the feeders of these lakes; but that it was to be sought in a basin westward of them, through which flow three large rivers, all called Lualaba, and which unite to form another great lake, which he called Lincoln. Out of this a river runs n., which he conceived to be the main branch of the Nile. Geographers in Europe and America generally believed that Livingstone mistook the case, and had struck instead on the source of the Congo; but the death of the great traveller before the completion of his explorations left the problem unsolved. It was not until Stanley 1876–7 followed the course of the Lualaba to its mouth that this stream was proved to be the Congo. Numerous explorations since have located the extreme source of the Nile in the Nyavorongo headstream of the Kagera feeder of Victoria Nyanza, in 2° 30′ S. For the dam and great barrage at Assouan see EGYPT.

NILES, *nīlz:* city in Berrien co., Mich., on St. Joseph river, at head of navigation; on Michigan Central railroad; 93 m. e. of Chicago. A dam crossing the river supplies it with water-power. It has manufactories of various kinds, foundries, machine shops, flouring-mills, newspaper offices, public schools, and churches. Large quantities of flour, grain, fruit, and lumber are shipped here. It was was settled in 1828. Pop. (1910) 5,156.

NILES, NATHANIEL: 1741, Apr. 3—1828, Oct. 31; b. South Kingston, R. I. After studying at Harvard he entered Princeton College, graduating 1766. He studied medicine, took a law course, taught in the schools of New York, and studied theology under Dr. Bellamy, Congl. pastor in Bethlehem, Conn. He was licensed to preach, and temporarily supplied various pulpits, making his home in Norwich, Conn. While residing here he invented an improved method of making wire, and built a factory for carding wool. At the close of the revolution he purchased some unimproved land in Vt., and built the first house in what is now the town of West Fairlee. In this house he preached for a long period. He was elected to the state legislature, was speaker of that body 1784, was a supreme court judge, was six times chosen presidential elector, assisted in the revision of the state constitution, and was a member of congress 1791–95. He was a trustee of Dartmouth College 1793–1820, and received the degree A.M. from this institution, also from Harvard. He wrote a popular war-song entitled *The American Hero,* was a contributor to the *Theological Magazine,* and published several sermons. He died at West Fairlee, Vermont.

NIL'-GHAU: see NYL-GHAU.

NILL, v. *nĭl* [OE. for *ne will,* not will]: in *OE.,* to not will: to refuse; to be unwilling.

NILOMETER, n. *nīl-ŏm'ĕ-tĕr* [L. *Nilus*; Gr. *Neilos*, the Nile, and Gr. *metron*, a measure]: a graduated pillar for ascertaining the height of the periodical rising of the Nile. NILOTIC, a. *nīl-ŏt'ĭk*, relating to the Nile.—*Nilometer* was the name given also to two buildings in Egypt, one in the island of Rhoda opposite Cairo; the other at Elephantine, close to Assouan, 24° 5′ 23″ n. lat. The first consists of a square well, in which is placed a graduated pillar of marble, and is called a *mekkïas* or measure; the pillar contains 24 *devakhs* or cubits, each of which measures 21·386 inches, or according to Greaves, 1·824 ft., and contains 24 digits; but in its present state, it does not appear to have been intended to mark a rise of more than 16 cubits This pillar is exceedingly slender. The building formerly had a dome, bearing a Cufic inscription, dated 847, and is said to have been erected by the Caliph Mamun, or his successor Wathek Billáh. The first-mentioned monarch is said to have erected another N. at the village of Banbenouda, in the Saeed, and to have repaired an old one at Ekhmin. The Caliph El Motawukkel built the present one. The mode of calculating the increase at the N. is rather complex, and to a certain extent arbitrary, political and financial reasons rendering the process a mystery even to the natives. At the present day the Nile is supposed to have risen to 18 cubits when the canals are cut; this is the height of the lowest inundation; 19 cubits are considered moderately good, 20 excellent, 21 adequate, and 22 complete, 24 are ruinous. In the time of Edrisi, however, 16 cubits were considered sufficient. The object of these nilometers was to measure the amount of taxation to be imposed on the country. The N. at Cairo is, however, much more reeent than that at Elephantine, which consists of a staircase between two walls descending to the Nile. One of these walls has engraved on it a series of lines at proper intervals marking the different elevations to which the river rose under the Cæsars. The cubits here are divided into 14ths or double digits, and measure 1 ft. 8·625 inches. This N. is described by Strabo. Probably there were many nilometers in the days of the Pharaohs, perhaps one in each city. In the days of Mœris, 8 cubits were sufficient, but 15 or 16 were required in the time of Herodotus, B.C. 456, and this was the mean under the Romans. According to Pliny, if the inundation did not exceed 12 cubits, it produced a famine, 13 starved the country, 14 rejoiced it, 15 was safety, and 16 delight, and this number is symbolically represented by the number of children playing round the river god on statues of the Roman period. The oldest N. appears to have been erected at Memphis, and it was transferred by Constantine to a church in the vicinity of the Serapeium; but Julian sent it back to this temple, where it remained till its destruction by Theodosius. At the present day, the rise is watched for with anxiety, and proclaimed by four criers.—Herodotus, II. 13; Strabo, lib. xvii.; Wilkinson, *Topogr. of Thebes*, 311–317. Hekekyan Bey, *Siriadic Monuments* (Lon. 1863), 145.

NILSSON, *nĭl'son* (ROUZAUD, *rō-zō'*), CHRISTINE; now Countess CASA DE MIRANDA: singer: b. Hussaby, near Wexiö, Sweden, 1843, Aug. 3; of a peasant family with musical tendencies. She taught herself the flute and violin, and sang with an older brother at peasant fairs in Sweden. It was thus she attracted the notice of her benefactor. After studying 2 years under Franz Berwald, she made her début in Stockholm, 1860; she studied 3 years in Paris and made her first appearance there 1864, Oct. 24, as Violetta in *La Traviata;* appeared London, 1867, in opera and oratorio; 1868, in Paris at the Grand Opera House as Ophelia in Ambroise Thomas's *Hamlet,* and in the same year she created a great sensation at the Handel Festival, in London. Her first appearances in the U. S. were in 1870 in concerts, 1871 in opera. She reappeared in London, at Drury Lane, 1872; visited St. Petersburg 1873; sang in Italian opera in London every season 1872–1877; revisited the United States 1873–4 and 1882, and made a tour of Scandinavia 1876. Her last appearance at New York was 1883, Apr. 16. She sang at a farewell concert in Albert Hall, London, 1888, June. Her voice is of moderate power, but remarkable for purity, sweetness, and brilliancy of tone, with a compass of nearly 3 octaves. Her most successful characters are Marguerite, Elsa, and Mignon. She has always been enthusiastically received and her success is unsurpassed. Her charming personality helps to render her popular. She married, 1872, London, Auguste Rouzaud, a Parisian banker, who died 1882; in Paris, 1887, Mar. 12, she married Count A. de Miranda of Spain.

NIMBLE, a. *nĭm'bl* [AS. *numol,* capable of catching: Icel. *nema,* to take: Dan. *nemme,* to learn, to apprehend]: light and quick in motion; active; brisk; expert. NIMBLY, ad. *-blĭ.* NIM'BLENESS n. *-bl-nĕs,* the quality of being nimble; quickness; celerity. NIMBLE-FOOTED, a. light of foot. NIMBLE-FINGERED, a. dexterous; in a bad sense, given to pilfer. NIMBLESSE, n., or NIMBLESS, n. *nĭm'blĕs,* in *OE.,* for nimbleness.—SYN. of 'nimble': agile; swift; quick; lively; prompt; expeditious; ready; speedy.

NIMBUS, n. *nĭm'bŭs* [L. *nimbus,* a bright or black cloud, a cloud-shaped splendor: It. *nimbo:* F. *nimbe*]: the rain-cloud (see CUMULUS); in *anc. myth.,* the cloud of light around the person of a god when he appeared on earth: in *art,* the circle of light around the heads of saints or sacred personages; a halo. NIMBIFEROUS, a. *nĭm-bĭf'ĕr-ŭs* [L. *fero,* I carry]: bringing clouds and storms.—SYN. of 'nimbus': aureola; glory; halo.—*Nimbus,* in mythologic art, was in almost universal use in those religions of which we possess any artistic remains—the Indian, the Egyptian, the Etruscan, the Greek, and the Roman. In the Hebrew Scriptures, we trace, in the absence of representations, the same symbolized idea in the light which shone upon the face of Moses at his return from Sinai (Exod. xxxiv. 29–35), and in the light with which the Lord is clothed as with a garment, Ps. ciii. 1, Vulg. (civ. 1, auth. vers.); and in the New Testament in the transfiguration of our Lord (Luke ix. 31)

and in the 'crowns' of the just, to which allusion is so often made (II Tim. iv. 8; I Peter v. 4; Rev. iv. 4). Nevertheless, the N., strictly so called, is comparatively recent in Christian art, appearing first toward the end of the 5th c. Later in Christian art, it became almost a necessary appendage of all representations of God or of the saints. Its ordinary form is the circular or semi-circular; a form, indeed, in which later symbolists discover an emblem of perfection, and of eternity; but the N. of the Eternal Father is often in the form of a triangle, and that of the Trinity an emanation of light, the rays of which form the three arms of a cross. The nimbus of the Virgin Mary is sometimes a simple ring, sometimes a crown or diadems; occasionally it is encircled by an ornamental border, on which 12 stars are sometimes represented. Her N., as well as that of the Divine Persons, is commonly of gold; but that of the Virgin Mary is occasionally in colors, e.g., blue, red, purple, or white. The N. of the saints is ordinarily the semicircle or lunula. Dedron mentions the curious instance of a picture of the traitor Judas *with a black nimbus*. In later art, the N. became lighter and more aërial, melting, as it were, into the picture; and in Raphael's saints it occasionally fades into the very faintest indication of a golden tinge around the head.—In connection with the N. may be mentioned two analogous forms—the *Aureole* and the *Glory*. The former is an illumination surrounding, not the head only, but the entire figure. If the figure be upright, the aureole is commonly oval, when it is called the *vesica piscis*, and is supposed to contain an allusion to the *icthys* (q.v.). With a seated figure it becomes circular, and is occasionally divided by radiating bands, in the form of a wheel; sometimes it takes a quatrefoil form. It is usually of gold, but occasionally in colors. The Glory is a combination of the N. and the aureole, and is seen chiefly in Byzantine pictures, and those of the early South German school.

NIMEGUEN, *nē'měh-ghĕn*, or NIMWEGEN, *nĭm'wā-ghĕn*, or NYMEGEN, *nī'měh-ghĕn* (Dutch NIJMEGEN, *nī'měh-ghĕn*): probably the oldest city in Gelderland, Netherlands, on the left bank of the Waal, 9 m. s. of Arnheim. The French name of N., *Noviomagum* of the Romans, is *Nimègues*. Several of the streets are steep and narrow, passing up the Hoenderberg (Hill of the Huns), on which the Romans had a permanent camp; others are broad and well built. On a near height, Charlemagne built a palace. On the brow of the hill there is a little 16-sided chapel or baptistery, originally a heathen temple of the Batavi, and converted into a Christian church by Pope Leo III. 799. On another eminence is a modern tower called Belvidere, from the summit of which is an extensive view, including the rivers Rhine, Waal, Yssel, and Maas. N. is strongly fortified and well garrisoned. The town-house, founded 1554, is beautifully and antiquely fitted up within; and externally ornamented by several statues of emperors and kings of the Romans. St. Stephen's, or the Great Church, on the highest part of the city, is a handsome Gothic edifice

in the form of a Greek cross, and before the Reformation contained 30 altars. N. is a large market for cattle and agricultural produce, especially grain. Beer is extensively brewed, eau de Cologne distilled, and there are factories for spinning and weaving; tin-goods and earthenware stoves are manufactured.

N. is celebrated for the great peace congress of the European powers which 1678, Aug. 10, concluded a treaty between Spain and France; Sep. 17, between France and the United Netherlands; and between the German Empire and France, and the same empire and Sweden, 1679, Feb. 5. Pop. (1881) 26,629; ,1891) 32,618; (1901) 45,304.

NIMES, or Nismes, *nēm* (anc. *Nemausus*): town of France, cap. of the dept. of Gard; in a fertile plain surrounded by vine-clad hills, 30 m. n.e. of Montpellier, with which it is connected by railway. It consists of the town proper (ill built and dirty), and of three handsome suburbs. In the vicinity are the beautiful remains of the Roman aqueduct *Pont du Gard*. The chief of the modern edifices are the *Palais-de-Justice*, the theatre, and the hospitals. The *Grande Place* is embellished with one of the most magnificent fountains in France. N. contains numerous and variously-constituted educational institutions, an important public library, Maria Theresa's Museum (in the *Maison Carrée*), museum of natural history, etc. It is the general entrepôt for the silks produced in s. France, and its manufactures are principally silk and cotton fabrics. More than 10,000 looms are constantly in operation in the city, and about 6,000 in the immediate vicinity. Shawls, handkerchiefs, lace, brandy, wines, etc., are made. Within the town are numerous and beautiful Roman remains, chief of which are the amphitheatre; *Maison Carrée* (Square House), a fine specimen of Corinthian architecture; a temple and fountain consecrated to Diana; *La Tour Magne* (Great Tower); the baths, and two Roman gates. See Menard's *Antiquités de N.* (1838), and his *Histoire de N.* (7 vols. 1875).

Previously to the Roman invasion, N.—supposed to have been founded by a colony from Massilia (Marseille)—was the chief city of the Volcæ Arecomici. It flourished under the Romans, and was one of the great cities of Gaul. It was under the rule of the Visigoths 465–535, afterward under that of the Franks. Subsequently, it became a possession of Aragon; but was finally restored to France 1259 by the treaty of Corbeil. The inhabitants adopted Calvinism in the 16th c., and on many occasions suffered severely for their religious principles. In 1791 and 1815, bloody religious and political reactions took place here. Pop. (1881) 62,549; (1891) 71,623; (1901) 80,605.

NIMROD, n. *nĭm'rŏd:* the mighty hunter of Scripture, Gen. x. 9; 'a mighty hunter, and his prey man' (*Milton*): thence, a great hunter; a devastating warrior.

NIMRÚD, *nĭm-rôd′:* area of ruins near the junction of the Tigris and the Zab rivers, in Asiatic Turkey. The ruins are of the ancient city Kalhu, the Calah of the Bible, for a time the capital of Assyria, and founded by Shalmaneser I. B.C., 1300—Assur, further south, having preceded it as the royal residence, and Khorsabad and Nineveh following it. Layard first excavated the remains—a quadrangle, about a mile and a third by a little over a mile in dimensions. A wall had inclosed it, with towers and moats. The principal palace, in the n.w. quarter, was built by Assur-nasir-pal, who removed his residence to Calah, and also erected a temple with a great tower. He was succeeded B.C. 860 by Shalmaneser II., builder of the central palace, and conqueror of the league of three kings —Ahab of Israel, Benhadad of Damascus, and Baasha the Ammonite. The s.w. palace was that of Esarhaddon; the s.e. one was chiefly a temple of Nebo—a statue of whom, taken from it, is now in the British Museum. The n.w. palace was 350 ft. square. After Assur-nasir-pal's restoration of Calah, it remained the royal residence 170 years, when Sargon, invader of Samaria, made Khorsabad his seat. Nineveh afterward became the capital under Sennacherib, and was destroyed, with Calah, by the Medes and Babylonians, B.C. 608.

NIMRUD′, Birs: see Babel, Tower of.

NINCOMPOOP, n. *nĭn′kŏm-pôp* [said to be a corruption of the L. *non compos*, not competent, in the phrase, *non compos mentis*, not possessing mind, of unsound mind]: a fool; a trifler; a silly fellow.

NINDE, *nīnd*, William Xavier, D.D.: b Cortland, N. Y., 1832, June 21. He graduated from Wesleyan Univ. 1855; taught in Rome, N. Y.; became a Meth. Episc. minister 1856, and after various pastorates in O., visited Europe and Palestine 1868–9; was prof. of theol. in Garrett Biblical Institute, Evanston, Ill. 1873; and became pres. of that institution 1879. He was pastor of the Central Meth. Episc. Church, Detroit, 1876–79; delegate to the Ecumenical Conference, London, 1881; was elected bp. 1884; visited India 1885-6, when he re-organized the conferences and inspected the missions; and attended the Denmark conference 1887. He died 1901, Jan. 3.

NINE, a. or n. *nīn* [Dut. *negen;* Icel. *nin;* Sw. *nio;* Goth. *niun*, nine: L. *novem;* Gr. *ennĕă;* W. *naw;* Skr. *navan*, nine]: one more than eight. Nineteen, n. *nīn′tēn*, nine and ten. Nine′teenth, a. *-tēnth*, the ordinal of nineteen. Nine′tieth, a. *-tĭ-ĕth*, the ordinal of ninety. Ninety, a. and n. *nīn′tĭ*, nine times ten. Ninth, a. *nīnth*, the ordinal of nine: N. a ninth part: in *music*, an interval consisting of an octave and a tone or semitone; being the same interval which, an octave lower, is termed the second (see Interval). Ninth′ly, ad. *lĭ*, in the ninth place. Ninefold, nine times repeated. Nine-holes, an old game played with a ball and nine holes in the ground. Nine-pins, a play with nine pieces of wood placed on end and aimed at with a ball. Nine-men's-morris, a dance by men dressed as nine-pins. The Nine, the Muses.

NINEVEH, *nĭn'ē-vĕh*, or NINUS, *nī'nŭs:* very ancient and famous city, cap. of the great Assyrian empire, said in Scripture (Gen. x. 11) to have been founded by Ninus or Nimrod. It was on the e. bank of the Tigris, opposite the present Mosul. According to the accounts of the classic writers, the city was of vast extent, 480 stadia, or more than 60 m. in circumference. Its walls were 100 ft. high, broad enough for three chariots, and furnished with 1,500 towers, each 200 ft. in height. In the *Book of Jonah* it is described as an 'exceeding great city of three days' journey,' and one 'wherein are more than sixscore thousand persons that cannot discern between their right hand and their left hand' (children or infants are probably meant) After having been for many centuries the seat of empire, it was taken after a siege of several years and destroyed by the united armies of the Medes under Cyaxares, and the Babylonians under Nabopolassar, about B.C. 625. When Herodotus, not quite 200 years afterward, and Xenophon visited the spot, there remained only ruins. Tradition continued to point to the site of N.; but it is only of late years that actual explorations have been made: for account of these, see ASSYRIA.

NINGPO, *nĭng-pō':* great city and sea-port of China, at the confluence of two small streams, lat. 29° 5′ n., long. 121° 32′ e., 12 m. from the sea, on an alluvial flat of extreme fertility, intersected by a net-work of rivulets and canals; chief city of the dept. of N. in the province of Chekiang. Its walls are five m. in circumference, about 25 ft. high, 22 ft. wide at the base, and 15 at the top, with six double gates. As with all the cities in this part of China, N. is permeated by canals communicating with a moat nearly surrounding the walls, and with the adjacent country. In one part of the city they expand into basins, and receive the name of lakes—Sun Lake and Moon Lake. In the Sun Lake is an island devoted to temples, and accessible by bridges. These bridges—good specimens of those aerial stone edifices which adorn this part of China—are required to sustain little more than their own weight, as the roads here are all mere footpaths, and there are no wheeled vehicles. One of the rivers is crossed by a bridge of boats, 200 yards long. The entire city is well paved; the streets are wider than those of most Chinese cities, and the display of shops is indicative of wealth and luxury. Nowhere, save at Hanchau, are such extensive and beautiful temples. The most elegant and costly of these is dedicated to the Queen of Heaven; the goddess being the daughter of a Fuhkien fisherman, the people of that maritime province are her more special votaries. Elaborate stone sculpture, exquisitely fine wood carving, and a profusion of gilt and tinsel, show that no expense has been spared to honor the popular goddess.

The centre of the city is ornamented with an elegant 14-storied hexagonal tower with seven tiers of windows—the heaven-bestowed pagoda, 160 ft. in height. A spiral flight of steps within the walls of the tower leads to the summit, from which the gazer beholds a splendid scene; innumera-

ble villages dot the plain, which is reticulated by silvery water-courses, replete with evidence of successful commerce and agriculture. The population of the plain is about 2,000,000. On many of the hills which environ these cities, green tea is cultivated; while the mulberry, the tallow-tree, and numerous other stimulants of industry abound. Two crops of rice are procured annually from the fields; while the fisheries of the rivers and adjacent coast give employment to a numerous class of the population. Ice-houses close to the river give the banks a picturesque appearance; the ice is used for curing fish. N. has extensive coasting trade; and considerable foreign trade has been developed, notwithstanding the proximity and formidable competition of Shanghai. It is, however, less than it was formerly, now being chiefly a distributing centre for Shanghai. Its total trade, annually, averages $10,000,000: principal exports, tea, cotton: imports, opium, sugar, etc. The dist. city of Chinhai, at the mouth of the Ningpo river, also is a port. A walled town, containing about 30,000 inhabitants, 10 m. e. of Chinhai, is Kingtang, nearest of the Chusan archipelago. Tinghai is the dist. city of the island of Chusan, which is 20 m. long, 6 to 10 wide, and 51 in circumference; mountainous, with fertile valleys in high cultivation; it has an excellent harbor.

NINIAN, *nĭn'ĭ-an* (or NINIANUS, *nĭn-ĭ-ā'nŭs*, or NYNIAS, *nĭn'ĭ-as*), SAINT: apostle of the Picts; latter half of the 4th and beginning of the 5th c. Whether Christianity had been introduced among the Picts before the time of N. has been a subject of controversy; but though the details of the legendary account are uncertain, it seems beyond question that there were Christians, at least among the Southern Picts, in what is now known as the Lowlands of Scotland, from the end of the 2d c. Nevertheless, either their number was originally very small, or the rising church had fallen away under adverse circumstances; and it is certain that when N. appeared among them, the Picts were in the main a pagan people. He was a Briton, and of noble birth; but had been educated at Rome, and there ordained a bishop. The exact time of his preaching in Scotland is unknown. His labors appear to have commenced in Cumbria, and to have extended over the greater part of the district as far n. as the Grampian Hills, his see being fixed at Candida Casa, or Whithorn in the modern Wigtonshire. An old Irish account states that in his later years he labored in Ireland, founding a church in Leinster. The date of his death is unknown; it is placed by the Bollandists in 432; his festival in the Church of Rome is September 16.

NINNY, n. *nĭn'nĭ* [Sp. *niño;* prov. It. *ninno*, a child; Gr. *nēniēlos*, foolish, senseless: mod. Gr. *ninion*, a child, a doll: comp. Gael. *neoni*, a fool, a nonentity]: a childish person; a fool; a simpleton.

NINON DE LENCLOS, *nē-nōng' deh lâng-klō':* famous or infamous Frenchwoman, one of those characters that could have appeared only in the French society of the 17th c.: 1615–1705; b. Paris, of good family. Her father instilled into her mind the epicurean principles of Montaigne, whose *Essays* she read at the age of ten. As a child she was remarkable for grace of person and of manner. She was carefully schooled, spoke several languages, excelled in music and dancing, and had a great fund of sharp and lively wit. At the age of 16, she commenced her long career of licentious gayety, with a succession of favorites, many of whom were of the highest rank and social position. She had two sons, but never showed in regard to them the slightest instinct of maternity. In her later years she settled down to the social leadership of Paris; and men of letters and men of wit and refined ladies gathered to her salon. N.'s manners were perhaps more effective than her beauty: the most respectable and virtuous women sent their children to her house to acquire taste, style, politeness. So great was her reputation, that when Queen Christina of Sweden came to Paris, she said she wished particularly to visit the French Acad. and Ninon de Lenclos. Her wit and brightness are indicated by the fact that Larochefoucauld consulted her upon his maxims, Molière upon his comedies, and Scarron upon his romances. She died at the age of 90, having preserved some remains of her beauty almost to the last. In most of her biographies are many stories quite unauthentic.—See Guyon de Sardière's *Vie de Ninon de Lenclos;* Saint-Evremond's *Œuvres;* Douxmesnil's *Mémoires pour servir à l'Histoire de Mlle. de Lenclos.*

NIOBE, n. *nī'ŏ-bē:* in Greek mythology, daughter of Tantalus and (according to the most popular version of the story) sister of Pelops; she was wife of Amphion, King of Thebes, and bore him six sons and six daughters. Proud of her children, she despised Leto or Latona, who had only two children, Apollo and Diana, and prevented the people from the worship of these divinities; whereupon Latona, enraged, moved her children to destroy all the children of N. with their arrows. The slain 12 lay nine days in their blood unburied, when Jupiter changed them into stone, and on the tenth day they were buried by the gods themselves. N. wandered about in distress, and at last was changed into stone on Mount Sipylus, between Lydia and Phrygia, retaining, however, even as stone a sense of her woe. Such is the Homeric legend, afterward much varied and enlarged. N. was a favorite subject of the ancient artists. A group representing N. and her children was discovered at Rome 1583, and is now in Florence. Some of the sculptures are very beautiful. Even the ancient Romans were in doubt whether the work proceeded from Scopas or Praxiteles. N. in poetry is the personification of woman's sorrow.

NIOBIUM, n. *nī-ō'bĭ-ŭm*, or COLUMBIUM, *ko-lŭm'bĭ-ŭm*. chemical element, of the Tantalum group, symbol Nb. The name Columbium, now discarded, was given to the N. in columbite, a black crystallized niobate of iron and manganese, found first in Mass., afterward in N. C. and Colo. From N., tantalum was separated by H. Rose. N. occurs also in Samarskite, pyrochlore, Wöhlerite, euxenite, and Fergusonite. As a metal, it is steel-gray, of high lustre, and resists acids at ordinary temperatures, except sulphuric, in which it rapidly dissolves to a colorless solution. NIOBIC, a. *nī-ō'bĭk*. denoting an acid obtained from niobium.

NIOBRARA. *nī-ō-brâ'ra*, RIVER, or L'EAU QUI COURT stream about 450 m. long; rises in Laramie co., Wyo., flows e. through n. Nebraska, and joins the Missouri about 36 m. s.w. of Yankton, S. D. It is very swift in its course though shallow and not navigable; cuts through a deep cañon in its upper part, then passes through the sand hills of n. Neb., while the lower valley is fertile and well watered.

NIORT *nē-ōr':* town of France, cap. of the dept. of Deux-Sèvres, on the Sèvre-Niortaise, 255 m. s.w. of Paris; in an agreeable country, occupying the slope of two hills and the valley which intervenes, 110 m. n. of Bordeaux. N. is an ancient town. In the 14th c. it was taken by the English and held 18 years. Its principal edifices are the Church of Notre-Dame, town-hall, theatre, and old castle. Besides these, the beautiful Fountain du Vivier, the promenades, the library (30,000 vols.), and the college are worthy of notice. Dressing of chamois and manufacture of gloves are principal industries. Dye-works and tanneries are in operation. Pop. 20,750.

NIP, n. *nĭp* [Ger. *knipp*, a snap or fillip with the fingers; *knippen*, to snap: Dan. *nappe*, to snap]: a pinch with the nails; a bruise or cut with something sharp; a cutting off the end; destruction of the ends of plants by frost; a sip, as of liquor: V. to pinch, as with the nails; to cut or pinch off the ends of anything; to blast; to kill or destroy; in *OE.*, to ridicule or satirize. NIP'PING, imp.: ADJ. sharp; chilling; removing by biting or cutting, as with the nails or teeth. NIPPED, pp. *nĭpt*. NIP'PER, n. he or that which nips. NIPPERS, n. plu. *nĭp'ĕrz*, small pincers. NIP'PINGLY, ad. *-lĭ*. TO NIP IN THE BUD OR BLOSSOM, to destroy prematurely.—SYN. of 'nip, v.': to pinch; blight; numb; chill; vex; bite; ridicule; to kill or destroy.

NIPA, *nī'pa:* genus of endogenous plants referred by some botanists to the order *Pandanaceæ*, by others to palms. *N. fruticans* is very common in the Eastern Archipelago, and northward in s.e. Asia as far as the Mergui river, but becomes rare further n. It flourishes with the mangrove in places inundated when the tide rises. It abounds in saccharine sap, from which a kind of *Palm Wine* is made, also excellent sugar. The leaves are much employed for roofing houses, and large quantities are sent from the Tenesserim provinces northward for this use.

NIPADITES, n. plu. *nĭp'ă-dīts* [*nipa*, E. I. name of a fine palm]: genus of fossil palm fruits found in the Eocene clays of the island of Sheppey, in Kent, England. They are referred to *Nipa* (q.v.) as their nearest living ally, and are considered to have resembled in habit that genus, and to have grown on the banks of an immense river which flowed from the tropical regions of a continent lying southward, and which entered the sea at Sheppey, where it deposited the fruits and leaves borne down with the current, by the side of the starfishes and mollusca which inhabited the estuary. About 13 different kinds have been described.

NIPH'ER, Francis Eugene: American physicist and electrical engineer; b. Port Byron, N. Y., 1847, Dec. 10. He was graduated from the Iowa State University in 1870, and became instructor there. He afterward went to Washington University as professor of physics and electrical engineering. In 1877 he organized the weather service of Missouri and in 1878 the Magnetic Survey. In 1889 he showed that positive photographic pictures could be developed in the full glare of sunlight instead of in a dark-room; and he also made the discovery that a photographic plate over-exposed could be developed as a positive and that a zero point exists between the negative and the positive which cannot be developed at all. He wrote: *Theory of Magnetic Measurements* (1886); *Electricity and Magnetism* (1895); *Introduction to Geographical Algebra* (1898). He has also contributed scientific articles to the *Transactions* of the St. Louis Academy of Science, of which he is a member.

NIPIGON, *nĭp'ĭ-gŏn* (or Nepigon, *nĕp'ĭ-gŏn*), Lake: body of water in Ontario, Canada, 40 m. n. of Lake Superior, n. of the line of the Canadian Pacific railway. It is about 70 m. long from n. to s. and 50 m. wide from e. to w.; surface is 813 ft. above Lake Superior; total length of shore about 580 m. The lake is deep, well studded with islands, abounds with fish, and is fed by a large number of mountain streams. It has its exit by the Nipigon river into Nipigon Bay, in the n. of Lake Superior. This river in its course expands into four small lakes, and has several falls and rapids.

NIPISSING, *nĭp'ĭs-ĭng* (or Nepissing, *nĕp'ĭs-ĭng*), Lake: body of water in Ontario, Canada, between Lake Huron and the Ottawa river; length about 45 m., greatest breadth 28 m. It is connected with a chain of smaller lakes in the n. by Sturgeon river; its waters flow out by French river, 55 m. long, into Georgian Bay, an inlet of Lake Huron. The Nipissing Indians, at the time of the French Conquest, very numerous around the lake, were a branch of the Algonquin stock (see Algonquins; Indians, American). They were driven away by the Iroquois; but a remnant live here still under protection of a Rom. Cath. mission.

NIPPERS. See under Nip.

NIPPLE, n. *nĭp'pl* [a dim. of *neb* or *nib:* Esthon. *nip*, point, end]: that part of the female breast from which the milk is drawn; a teat or dug (see MAMMARY GLAND): that part of the lock of a gun over which the percussion-cap is placed. NIPPLED, a. *nĭp'pld*, covered with nipple-like protuberances. NIP'PLY, ad. *-plĭ*.

NIPPON, *nĭp-pŏn'* (incorrectly NIPON, *nĭp-ŏn'*, or NIPHON, *nĭf-ŏn'*): name improperly given by Europeans to the principal island of Japan, and borrowed from the Japanese name of the empire, which is *Dai Nihon* or *Nippon*. The chief island or 'mainland,' which is by far the largest part of the empire, had no separate native name till lately, but is now officially called *Honshiu*, or *Hondo*. The inland sea of Suonada separates the so-called N. from the island of Kiushiu and Shikoku, and the Strait of Sangar on the n.e. from the island of Yesso. The island has an extreme length of 900 m., extreme width nearly 200 m., average width about 100 m.; area about 147,655 sq. m. Of the total pop. of Japan, over 47,812,700, the main island contained 27,250,000. Most of the chief towns of the empire are on the island, including the capital Tokio or Yedo; Miako or Kioto, Osaca, Hiogo, Kanagawa, Yokohama, and Niigata. See JAPAN.

NIPPUR, *nĭp-pôr':* Asiatic Turkey, an ancient city of Babylonia, between the Tigris and Euphrates, 120 m. s.e. of Bagdad, its site now marked by the numerous mounds and excavated ruins at Nuffar. Nippur was a great and flourishing city 4000 B.C., and the tablets of its great library discovered since 1888 antedate Abraham's departure from Ur of the Chaldees for the Promised Land. Nippur is identified with the Calneh of Genesis x. 10, and was the most northerly and easterly of the four conspicuous centres of Babylonian civilization and religion, literature and science. It was the seat of the worship of Bêl, or the sun, the angry En-Lil, or Lord of the Storm, the cause of all the weather troubles of mankind, and the original conception of a god of anger and a religion of fear.

Nippur was overthrown and its buildings ruined by the Elamite hordes under Kudur-Nankhundi, 2285 B.C., who destroyed nearly every city of Babylonia. Favored by the permission and protection of the Sultan and his administration, the University of Pennsylvania has since 1888 excavated and laid bare many of its important ruins. The work was supervised first by Dr. John Punnett Peters, and latterly by Dr. J. H. Haynes and Professor H. V. Hilprecht. Considerable attention was paid to the excavation of the great temple of Bêl, the foundation of which was laid between 6000 and 7000 years before Christ. An ancient government palace of immense proportions, where the kings lived, belonging to the fifth millennium before Christ, and one of the ancient gates and walls of the city, were uncovered. A government palace erected about 3000 B.C. was completely and systematically excavated, besides numerous other build-

ings of less importance. Most valuable inscriptions in stone belonging to the earliest rulers of Babylonia, by the help of which the early history of mankind in the valley between the Tigris and Euphrates will be reconstructed, were discovered. Antiquities in coins, jewelry in gold, silver, and bronze in great quantities; vases in enameled and plain pottery of all periods; seals and seal cylinders, such as the Babylonians used in connection with their business transactions; images of gods, playthings in terra-cotta, bas-reliefs, weights, utensils in bronze, iron, and silver, etc., were also found. These were a few of the important relics recovered, without mentioning the numerous facts ascertained and the many questions solved through study in the trenches, which have important bearing upon the religious ideas and customs of the daily life of the Babylonians. But chief of the important discoveries made during 1889-1900 were those in connection with the famous library of the sanctuary, which was found beneath 25 feet of accumulated débris, representing several millenniums of history. In the uppermost stratum of this mound the excavators found coffins which had been buried in the early centuries of our Christian era. A great many antiquities were also gathered which belonged to the Jews who continued to live at Nippur after the return of Ezra and Nehemiah. Prominent among them were terra-cotta bowls containing incantations and charms inscribed in Hebrew and Mandæan. At a depth of 25 feet were found a series of rooms, a number of which contained ledges or shelves built out from the wall, for the purpose of laying out the tablets in rows. The library seems to have been divided into two parts. There was a business section for keeping accounts, and the educational quarters, with a vast library of a literary character.

Nearly 20,000 tablets were recovered, illustrating practically every branch of literature known to the Babylonians. Among the inscriptions are hundreds of historical texts, dictionaries, or lists of Sumerian words with Semitic equivalents; lists of birds, animals, plants, and stones; lists of words for chairs, stools and other articles of furniture; hymns, astronomical and mythological inscriptions, tablets which refer to the service and functionaries of the temple—how many garments the god Bêl wore, how many temples and shrines there were at Nippur besides those dedicated to Bêl, and what the revenues of the temples were; tablets containing grammatical sentences written by students, arithmetical calculations, etc.

In appreciation of Professor Hilprecht's valuable services, the Sultan presented him with among other important antiquities, the larger part of the find of the library, which is now deposited in the University of Pennsylvania, and is undergoing systematical decipherment.

Only a small portion of the mounds at Nippur has thus far been completely excavated. Considerable work

yet remains to be done on the temple. Only one side of the ancient government palace has been cleared, and about one-twentieth part of the library, but arrangements have been effected for a continuance of the work of excavation until complete. Consult: Hilprecht's *Old Babylonian Inscriptions, Chiefly from Nippur* (1893-6) and *Explorations in Bible Lands During the Nineteenth Century* (1903); Peters, *Nippur, or Explorations and Adventures on the Euphrates* (1897).

NIRUKTA, or 'Explanation:' Hindu name of one of the six *Vedângas* (see VEDA) which explains difficult Vedic words. That there have been several works assigned for such a task, even since a very remote period of Hindu antiquity, and that they bore the name Nirukta is probable, for 'Nirukta authors' are quoted either generally or by name in several Sanskrit authors; but the work emphatically called *Nirukta*, and for the present the only surviving representative of this important Vedânga, is that of *Yâska*, predecessor of Pân'ini (q.v.). His work consists of three parts—the *Naighan't'uka*, where, for the most part, synonymous words are taught; the *Naigama*, which contains words that occur usually in the Vedas only; and the *Daivata*, which contains words relating chiefly to deities and sacrificial acts. A Commentary on this work by the same Yâska likewise bears the name Nirukta. In the comment Vedic passages are quoted in illustration of the words to be explained, and the comment given by Yâska on these passages is the oldest instance, known at present to Sanskrit philology, of a Vedic gloss. Besides the great importance which Yâska's *Nirukta* thus possesses for proper understanding of the Vedic texts, it is valuable also for its discussions on grammatical and other questions.

NIRVANA, n. *nêr-vâ'nă* [Skr. *nîr*, out; *vâna*, blown—*lit.* that which is blown out or extinguished]: in Buddhistic doctrine, term denoting the final deliverance of the soul from transmigration. It implies, consequently, the last aim of Buddhistic existence, since transmigration is tantamount to a relapse into the evils or miseries of *Sansâra* or the world. But as Hinduism, or the Brahmanical doctrine, professes to lead to the same end, the difference between *Nirvâna* and *Moksha*, *Apavarga*, or the other terms of Brahmaism designating eternal bliss, and consequent liberation from metempsychosis, rests on the difference of the ideas which both doctrines connect with the condition of the soul after that liberation. *Brahman*, according to the Brahmanical doctrine, being the existing and everlasting cause of the universe, eternal happiness is, to the Brahmanical Hindu, the absorption of the human soul into that cause whence it emanated, never to depart from it again. According to this doctrine, therefore, the liberation of the human soul from transmigration is equivalent to that state of felicity which religion and philosophy attribute to *that* Entity (see INDIA—*Religion*). As, however, the ultimate

cause of the universe, according to Buddhism, is the Void or Non-entity, the deliverance from transmigration is, to the Buddhists, the return to non-entity, or the absolute extinction of the soul. However much, then, the pious phraseology of their *oldest* works may embellish the state of N., and apparently deceive the believer on its real character, it cannot alter this fundamental idea inherent in it. We are told, for instance, that N. is quietude and identity, whereas Sansâra is turmoil and variety; that N. is freedom from all conditions of existence, whereas Sansâra is birth, disease, decrepitude and death, sin and pain, merit and demerit, virtue and vice; that N. is the shore of salvation for those who are in danger of being drowned in the sea of Sansâra; that it is the free port ready to receive those who have escaped the dungeon of existence, the medicine which cures all diseases, the water which quenches the thirst of all desires, etc.; but to the mind of the orthodox Buddhist, all these definitions convey but the one idea, that the blessings promised in the condition of N. are tantamount to the absolute 'extinction of the human soul,' *after* it has obeyed, in this life, all the injunctions of Buddhism, and become convinced of all its tenets on the nature of the world and the final destination of the soul.

Although this is the orthodox view of N., according to the oldest Buddhistic doctrine, it is necessary to point out two categories of different views which have obscured the original idea of N., and even induced some modern writers to believe that the final beatitude of the oldest Buddhistic doctrine is not equivalent to the absolute annihilation of the soul.

The first category of these latter, or, as we may call them, heterodox views, is that which confounds with N. the preparatory labor of the mind to arrive at that end, and therefore assumes that N. is the extinction of thought, or the cessation, to thought, of all difference between subject and object, virtue and vice, etc., or certain speculations on a creative cause, the conditions of the universe, and so on. All these views the Buddha himself rejects, as appears from the work *Lankâvatâra* (q.v.), where relating his discourse on the real meaning of N. before the Bodhisattwa Mahâmati. The erroneousness of those views is obviously based on the fact that the mind, even though in a state of unconsciousness, as when ceasing to think, or when speculating, is still within the pale of existence. Thus, to obviate the mistaken notion that such a state is the real N., Buddhistic works sometimes use the term *Nirupadhis'esha Nirvâna*, or 'the Nirvâna *without* a remainder of substratum' (i.e., without a rest of existence), in contradistinction to the 'Nirvâna *with* a remainder;' meaning by the latter expression that condition of a saint which, in consequence of his bodily and mental austerities, immediately precedes his real N., but in which, nevertheless, he is still an occupant of the material world.

The second category of heterodox views on the N. is that which, though acknowledging in principle the original notion of Buddhistic salvation, represents, as it were

a compromise with the popular mind. It belongs to a later period of Buddhism, when this religion, extending its conquests over Asia, had to encounter creeds which abhorred the idea of an absolute nihilism. This compromise coincides with the creation of a Buddhistic pantheon, and with the classification of Buddhist saints into three classes, each of which has its own N.; that of the two lower degrees consisting of a vast number of years, at the end of which, however, these saints are born again; while the absolute N. is reserved for the highest class of saints. Hence Buddhistic salvation is then spoken of, either simply as *Nirvâna*, or the lowest, or as *Parinirvâna*, the middle, or as *Mahâparinirvâna*, or the highest extinction of the soul; and as those who have not yet attained to the highest N. must live in the heavens of the two inferior classes of saints until they reappear in this world, their condition of N. is assimilated to that state of more or less material happiness which is held out also to the Brahmanical Hindu before he is completely absorbed into Brahman

When, in its last stage, Buddhism is driven to the assumption of an Adi, or primitive, Buddha, as the creator of the universe, N., then meaning the absorption into him, ceases to have any real affinity with the original Buddhistic term. See Buddhism: Lamaism.

NIS, v. *nĭs* [OE. *ne is*, not is]: in *OE.*, is not.

NISAN, n. *nī'săn* [Heb.]: a month of the Jewish calendar, answering to the month of March or April.

NISBET, *nĭs'bĕt*, Charles, d.d.: 1736, Jan. 21—1804, Jan. 18; b. Haddington, Scotland. He graduated from the Univ. of Edinburgh, studied theology, and was for several years pastor of a Presb. church in Montrose. His pronounced sympathies with the colonists in the Revolution caused dissatisfaction to his people. On the establishment of Dickinson College, Carlisle, Penn., N. was called to its presidency, and was inaugurated 1785, July 4. He administered the affairs of the institution with great skill, and delivered lectures on logic, philosophy, theology, and belles-lettres. He was a profound scholar. His works were published after his death; and his *Memoir*, by Dr. Samuel Miller, appeared 1840. He died at Carlisle.

NISCEMI, *nĭs-chā'mē:* town of Sicily, province of Caltanisetta, 10 m. n.e. from Terranova, on the right bank of the river Terranova. In 1790 this town was visited by an earthquake, and during seven shocks the ground gradually sank, in one place 30 ft. Fissures opened, which sent forth sulphur, petroleum, hot water, and mud. Pop. 12,110.

NISCH, or Nish, *nĭsh*, or Nissa, *nĭs'sâ:* one of the principal towns of Servia, in the district added to the principality by the Berlin Congress 1878, 122 m. s.e. from Belgrade. It stands on the river Nissawa, branch of the Morawa. The town is ill-built; but many new houses and a well-supplied bazaar attest its present prosperity. N. has long been noted as the point of meeting of many roads, of both military and commercial importance. Its importance

would be greatly increased by the proposed construction of a railway from Belgrade to Constantinople and Thessalonica. In ancient times N. bore the name *Naissos*, and was a flourishing town of Upper Mœsia; in it Emperor Constantine the Great was born. It was Slavonic in the 6th c., was taken by the Tatar Bulgarians in the 8th, by the Servians again in the 12th, and by the Turks 1389. Near N., 1689, the Markgraf Louis of Baden, with 17,000 men, destroyed a Turkish army of 40,000. Pop. (1901) 24,451.

NISHAPUR, *nĭsh-â-pôr'*, or NUSHAPUR: town of Persia, province of Khorassan, 53 m. w.s.w. of Meshid; in a most beautiful and fertile valley. It is surrounded by a rampart and trench, and has considerable trade in *turquoises*, which are obtained from mines in its vicinity. Pop. about 8,000

NISIBIS, *nĭs'ĭ-bĭs:* capital of anc. Mygdonia, the n.e. part of Mesopotamia; in a fertile district, and important, both as a place of strength and as an emporium of the trade between the east and west. N. was a city of very great antiquity, but of its remoter history nothing is known. In the time of the Macedonio-Syrian kings, it was called also *Antiochea Mygdoniæ.* It was twice taken by the Romans (under Lucullus and Trajan), and again given up by them to the Armenians; but being a third time taken by Lucius Verus, A.D. 165, it remained the chief bulwark of the Roman empire against the Persians, till it was surrendered to them by Jovian after the death of Julian 363. The name *Nisibin* is retained by a small village in the Turkish ejalet of Diarbekr, round which are numerous remains of the ancient city.

NISI PRIUS, *nī'sī prī'ŭs* [L. *nisi*, unless; *prius*, before, previously]: in *Eng. law*, a writ commencing with these words by which the sheriff is commanded to distrain the impannelled jury to appear at Westminster before the justices at a certain day in the following term, *unless* the justices come *before* that day to such a place. DECREE NISI, an order for the dissolution of a marriage, which remains imperfect six months, and is then made absolute, *unless* cause be shown then to the contrary. RULE NISI (see that title.—*Nisi Prius* in the United States denotes the system of trials of issues of fact in civil cases by a single judge sitting usually with a jury, in distinction from the hearing and determining of questions of law by a full bench, or as it is termed, by the court sitting in banco. In the one case the judge presides at the trial of some question of fact which is to be submitted to the jury generally; in the other case the judge, with two or three other judges, hears and determines questions of law which have been raised for the opinion of the court. All ordinary civil actions are heard and determined by the *nisi prius* courts. The decisions on questions of law made at *nisi prius* have not the weight and authority of the decisions made by the court in banc, because they are usually the decisions of a single judge, rendered at the spur of the moment, and without full argument by counsel.

NIT, n. *nĭt* [AS. *knitu ;* Icel. *nitr ;* Sw. *gnet ;* Dut. *neet*, a nit—originally, that which stings: Icel, *hnita*, to attack. to strike]: the egg of a louse or other like insect. NITTY, a. *nĭt'tĭ*, full of nits. NIT'TINESS, n. *nĕs*, state of being full of nits.

NITIDOUS, a. *nĭt'ĭ-dŭs* [L. *nitĭdŭs*, shining]: in *bot* having a smooth and polished surface; glossy.

NITI-GHAUT, *nē'tē-gawt:* pass of the Himalaya, between the British dist. of Kumaon and Tibet, 16,814 ft. above sea-level. It takes its name from the village of Niti, in Kumaon, 13 m. s. of the pass, lat. 30° 47′ n., and long. 79° 56′ e. This is regarded as the easiest pass between Kumaon and Tibet, and is consequently one of the principal channels of trade between Hindustan and Chinese Tartary. The Bhotias of Niti subsist chiefly by the carrying of goods in this trade. The articles of merchandise are conveyed on yaks, goats, and even sheep. Travellers often suffer much from difficulty of respiration on the pass of N.-G., on account of the rarefaction of the air at such an altitude.

NITRATINE, n. *nī'tră-tĭn* [see NITRE]: the mineralogical term for nitrate of soda, or Chili saltpetre.

NITRE, n. *nī'ter* [F. *nitre*—from L. *nitrum ;* Gr. *nitron*, a mineral alkali]: saltpetre or nitrate of potash (see NITRE, below); a crystalline substance of the appearance of salt, extensively used in the manufacture of gunpowder. NITRIARY, n. *nī'trĭ-er-ĭ*, an artificial bed where nitre is formed or made; a place where nitre is refined. NITRATE, n. *nī'trāt*, a salt formed by the union of nitric acid with a base, as *nitrate* of soda, *nitrate* of potash, etc. NITRATED, a. *nī'trā-tĕd*, combined with nitre. NITRIC, a. *nī'trĭk*, of or from nitre, as *nitric* acid. NITRIC ACID, a powerful acid composed of five parts of oxygen and two of nitrogen; aquafortis (see below). NITRIDE, n, *nī'trīd*, compound of the element nitrogen with a metal, also with phosphorus, silicon, or boron (see NITROGEN). NITRIFEROUS, a. *nī-trĭf'er-ŭs* [L. *fero*, I produce]: producing nitre. NITRIFY v. *nī'trĭ-fī*, [*fīō*, I am made]: to convert into nitre; to become nitre. NI'TRIFYING, imp. NI'TRIFIED, pp. *-fīd*. NITRIFICATION, n. *nī'trĭ-fĭ-kā'shŭn* [L. *facĭō*, I make]: the process of converting into nitre. NITRITE, n. *nī'trīt*, a salt of nitrous acid with a base. NITRY, a. *nī'trĭ*, pertaining to nitre. NITRATE OF SILVER, silver dissolved in nitric acid—the crystals being fused by heat, a white substance remains, which forms the caustic employed by surgeons. NITRATE OF SODA, a compound of nitric acid and soda (see NITRE, below). SPIRITS OF NITRE, a very volatile substance made from one part of nitric acid to nine of alcohol, which produces great cold during evaporation.

NITRE.

NI'TRE, or SALTPE'TRE, as it is frequently called: the nitrate of potash or potassium nitrate (KNO_3). It is a white, crystalline salt. It usually crystallizes in six-sided prisms, but under some conditions, rhombohedral crystals are formed. Its taste is cooling, and very saline; it is soluble in seven times its weight of water at 60° F., and in less than one-third of its weight of boiling water, but is insoluble in alcohol. When heated to about 642° F. (339° C.), it fuses without decomposition into a thin liquid, which, when cast in molds, solidifies into a white, fibrous, translucent mass, known as *sal prunelle*. At a higher temperature, part of the oxygen is expelled, and potassium nitrite is formed. Owing to the facility with which nitre parts with its oxygen, it is much employed as an oxidizing agent. Mixtures of nitre and carbon, or of nitre and sulphur, or of nitre carbon, and sulphur, deflagrate with great energy on the application of heat; and if nitre be thrown on glowing coals, it produces a brisk scintillation. *Touch-paper* is formed by dipping paper in a solution of nitre, and drying it.

Nitre does not occur in any living members of the animal kingdom, but is found in the juices of various plants, e.g., the sunflower, nettle, tobacco, barley, castor-oil plant, and others. It is found in small quantities in all vegetable soils and in most spring and river waters. It occurs as an efflorescence on rocks and walls of caves frequented by animals; and in drains, sewers, etc. The conditions for its formation seem to be: warmth, moisture, and the presence in the soil of decaying (nitrogenous) organic matter. The ammonium compounds formed by the decomposition of the organic matter are converted by the free oxygen of the atmosphere, which penetrates the soil to some distance, into nitrates. It was formerly supposed that the nitrogen of the decaying organic matter is directly oxidized by atmospheric oxygen into nitric acid, which combines with bases contained in the soil; but it is now known that the formation of nitrates in the soil is due to the presence of bacteria. There are two stages in the process, each stage performed by a distinct variety of microorganism: first, the ammonia compounds are converted into nitrites; second, the nitrites are converted into nitrates. This process is called *nitrification* (q.v.).

Nitre occurs as a natural product in many warm countries, Egypt, Persia, Hungary, and especially in East India. Large quantities were formerly, and small quantities still are, exported to Great Britain and the United States from Bengal. This is known as East Indian saltpetre. The crude salt is obtained by lixiviating the soil surrounding the house drains in old villages, and allowing the solution to crystallize. Formerly a large quantity of nitre was also formed in many countries of Europe artificially, by imitating the conditions under which it is naturally produced. These methods are now practically superseded by its artificial production by double decomposition from nitrate of soda.

Nitre is employed as an oxidizing agent in numerous chemical processes, as an ingredient of fireworks, and especially in the manufacture of gunpowder. It is used in medicine. In moderate doses (10 grains to a scruple) it acts as a refrigerant, diuretic, and diaphoretic; hence its use is indicated when we wish to diminish abnormal heat, and to reduce the action of the pulse, as in febrile disorders and hemorrhages.

Nitrate of potash is sometimes called *Prismatic Nitre* or *Potash Saltpetre*, to distinguish it from nitrate of soda, which is known in commerce as *Cubic Nitre* or *Chili Saltpetre*.

Cubic Nitre, or *Nitrate of Soda* ($NaNO_3$), derives its name from its crystallizing in cube-like rhombohedrons. It is also called *Chili Saltpetre*. It occurs abundantly on the surface of the soil in Chili. The crude nitrate is refined on the spot, and is exported in vast quantities. In 1896-7 the exports amounted to over 1,500,000 tons. A large proportion of this is used in agriculture as a fertilizer, the remainder is used in the manufacture of nitric and sulphuric acids and of potassium nitrate.

In most of its properties it resembles ordinary nitre, but in consequence of its greater deliquescence, it cannot be substituted for that salt in the manufacture of ordinary gunpowder; but is used in the preparation of some kinds of blasting powders and in the manufacture of dynamite. Cubic nitre is used in the production of potassium nitrate from a potassium salt by double decomposition. Being considerably cheaper than the potash salt, cubic nitre has entirely replaced it in the manufacture of nitric and sulphuric acids. It is used very extensively as a fertilizer.

As we depend upon Chili saltpetre to such a very large extent for our explosives and fertilizers, and as the nitre beds are being rapidly exhausted, the recent discovery of processes for manufacturing nitrates directly from atmospheric air is of great importance (see NITRIC ACID).

NITRIC ACID [symbol, HNO_3, equiv. 63.048, sp. gr. 1.521]. Known as *aqua fortis* by the older chemists. It is the most important derivative of the five compounds which oxygen forms with nitrogen (q.v.). It is a colorless, limpid, fuming, powerfully caustic substance, possessing intensely acid reactions. It boils at 187° F. (86° C.), and freezes at about 52° F. (47° C.). It enters into reactions of double decomposition with bases and with salts to form nitrates, some of which, as those of potash, soda, oxide of ammonia, silver, etc., are anhydrous, while others combine with a certain number (often six) of equivalents of water of crystallization. All nitrates are soluble in water, most of them are crystallizable and readily fusible by heat; and at an elevated temperature they are all decomposed, usually leaving only the oxide of the metal.

Nitric acid parts very readily with a portion of its oxygen to most of the metals, and hence is much used

in the laboratory as an oxidizing agent. Only a few metals, such as gold and platinum, do not act upon it. Its mode of action on the metals requires a few remarks. In order that a metal should unite with nitric acid, or any other acid, it is necessary that it should represent displaced or directly replace hydrogen. This generally involves oxidation, which is effected at the same time that the metal and nitric acid are brought in contact, by one portion of the latter becoming decomposed and converting the metal into an oxide, while the remaining portion combines with the oxide thus formed, to produce a nitrate. The exact nature of the decomposition varies in the case of different metals.

Nitric acid, whether in the concentrated or in a more dilute form, acts energetically on organic matters; e.g., in decolorizing indigo; in staining the skin and all albuminous tissues a bright-yellow color; in coagulating fluid albumen; and in converting many organic substances into nitrated compounds, often explosive, such as gun-cotton. See GUN-COTTON.

Nitric acid is not at all a stable compound. If it be exposed to the action of light it is gradually decomposed into nitric tetroxide (N_2O_4) (the peroxide of nitrogen of Graham) and oxygen; and mere distillation produces to some extent a similar effect. When it is mixed with water it emits a sensible amount of heat, owing to its affinity for water; it is found that a weaker acid when heated parts with its water, and a stronger acid with its acid, till each arrives at the density of 1.414.

The so-called *Fuming Nitric Acid* is merely a mixture of the pure acid with lower oxides.

The anhydride of the acid is the pentoxide of nitrogen (N_2O_5, nitric anhydride). Owing to the great affinity of this substance for water, the anhydride remained unknown until 1849, when Deville showed that it might be obtained in transparent colorless crystals by the action of perfectly dry chlorine gas on well-dried crystals of nitrate of silver. the reaction being exhibited in the equation:

Nitrate of Silver.	Chlorine.	Chloride of Silver.	Nitric Anhydride.	Oxygen.
$2AgNO_3$	$+2Cl$	$=2AgCl$	$+N_2O_5$	$+O$

It is a very unstable compound, and sometimes explodes spontaneously. It dissolves in water with evolution of much heat, and forms nitric acid.

Nitric acid does not occur naturally in a free state; but is found moderately abundant in combination with potash, lime, magnesia, and particularly with soda as Chili saltpetre; and after thunder-storms traces of it, in combination with ammonia, are found in rain-water.

It is usually prepared in the laboratory by the application of heat to a mixture of equal weights of powdered nitre (potassium nitrate) and oil of vitriol (sulphuric acid) placed in a retort. Potassium sulphate remains in the retort, while the nitric acid distils over, and is condensed in the receiver, which is kept cool by the appli-

cation of a wet cloth or otherwise The reaction is explained by the equation:

Nitre.	Sulphuric Acid.	Nitric Acid.	Bisulphate of Potash.
KNO_3	+ H_2SO_4 =	HNO_3 +	$KHSO_4$.

During distillation red fumes appear, arising from the decomposition of a portion of the nitric acid and a formation of some of the lower oxides of nitrogen. In this operation *two* equivalents of oil of vitriol are taken for *one* of nitre, these being the proportions found by experience most suitable. If they are taken, equivalent for equivalent, a very impure red fuming acid is the result. In the manufacture of nitric acid on the large scale, the glass retort is replaced by a cast-iron cylinder coated with fire-clay, and the receiver by a series of earthen condensing vessels connected by tubes; and solium nitrate, found native in Chili, is substituted for nitre, in consequence of its being a cheaper salt, and of its containing 9 per cent. more nitric acid.

The tests for this acid when it is present in small quantities are less satisfactory than those for the other ordinary mineral acids. All its compounds are so soluble that no *precipitant* for this acid is known. The best method for its detection is mixing the fluid to be tested with a little concentrated sulphuric acid, and then pouring a strong solution of protosulphate of iron upon it, so as to form a separate layer. If much nitric acid be present, a black color is produced; if only a small quantity is present, the liquid becomes reddish-brown or purple; the dark color being due to the formation of nitric oxide by the deoxidizing action of a portion of the iron salt on the nitric acid. The liquids should be kept unmixed when the color appears at the line of separation in the appearance of a colored ring.

The applications of this acid in the arts, in manufactures, and in chemical processes are very extensive. It is used for refining gold, silver and other metals, for etching on metals and stone, in the manufacture of sulphuric acid, and in the manufacture of nitrates, such as those of silver, lead, iron, etc. Great quantities are used in the manufacture of coal-tar colors (see DYES) and of explosives.

Until very recently Chili saltpetre has been the only commercial source of nitric acid; and as the nitre beds of Chili are being rapidly exhausted, it has been an important problem in chemistry where the world's supply of nitrates is to come from in the future. In 1785 Cavendish found that nitric acid can be formed in small quantities by passing a series of electric sparks through a mixture of pure nitrogen and oxygen in presence of a solution of caustic potash, which is a mere imitation, on a small scale, of the mode in which it is produced in the atmosphere by a thunder-storm. For many years scientific men have been trying to apply this principle to its manufacture; and recently this has been accomplished. Nitric acids, nitrites and nitrates are now being produced by the combination of atmospheric oxygen and nitrogen,

under the influence of high tension electrical discharge in a strong magnetic field. At Notodden, Norway, alone, some 30,000 electrical horse-power (generated by water-power) are already utilized; and other large plants to operate similar processes are in course of construction.

Medicinal Uses of Nitric Acid.—In the British and U. S. pharmacopœias there is both a strong and a dilute acid. The strong acid of the U. S. pharmacopœia has a specific gravity of 1·403, while the dilute acid is prepared by mixing one part of the former with 5·8 parts of distilled water, and has a specific gravity of 1·054. Formerly the British pharmacopœia called for a specific gravity of 1·5 for the strong acid. This has been abandoned for the lower strength (sp. gr. 1·42), but the British dilute acid has still its old strength (sp. gr. 1·101).

The dilute acid is used internally as a tonic in conjunction with bitter infusions. In many cases of chronic inflammation of the liver, and in syphilitic cases in which the employment of mercurials is inadmissible, it may be prescribed with great benefit, either alone or in conjunction with hydrochloric acid, externally as a bath or lotion, or internally in doses of about 20 minims properly diluted. The strong acid is useful as an escharotic; as to destroy warts, some kinds of polypi, the unhealthy tissue in sloughing ulcers, etc., and as an application to parts bitten by rabid or venomous animals. Largely diluted, as 50 or 60 drops of the strong acid to a pint or more of water, it forms an excellent stimulative application to torpid ulcers.

NITRILE, n. *nī′trĭl* [Gr. *nitron*, a mineral alkali: L. *nitrum; olĕŭm*, oil]: in *chem.*, an isometric form of an alcoholic cyanide; a hydrocyanic ether.

NITRION, n. *nī′trī-ŏn* [formed from *nitrogen* and *oxygen*]: in *chem.*, the salt radical of the nitrates.

NITRO-, *nī′trō-* [L. *nitrum* (see Nitre)]: common prefix in chemical terms—meaning, formed by or combined with nitric acid. Nitro-barite, n. *-băr′it* [NL. *barium*, barium]: native barium nitrate. Nitro-benzene, *-bĕn′zēn* or *bĕn-zēn′*, same as Nitro-benzol (q.v.). Nitro-benzol, n. *-bĕn′zōl*, artificial oil of bitter almonds (see below). Nitro-calcite, n. *-kăl′sīt* [L. *calx*, lime]: nitrate of lime, having a grayish-white color, occurring in efflorescences on old walls, and in limestone caves, especially where there exists decaying animal matter. Nitro-cellulose, n. *-sĕl′ū-lōs*, compound of cellulose and nitric acid; gun-cotton; collodion. Nitro-chloroform, n. *-klō′rō-fawrm* (CNO_2Cl_3), colorless liquid, very pungent, prepared by action of nitric acid on chloral; called also *chloropicrin*. Nitro-gelatin, n. *-jĕl′ą-tĭn*, mixture of nitro-glycerine with gun-cotton and camphor; a high explosive. At ordinary temperatures it is a transparent jelly. Nitro-glycerine: see below.

NI'TRO-BEN'ZOL, or NI'TRO-BENZENE ($C_6H_5NO_2$): yellow oily fluid, of specific gravity 1·2, which may be distilled without decomposition, crystallizes in needles at 37° F. (3° C.), and boils at 410° F. (210° C.). It has a sweet taste, is very slightly soluble in water, but dissolves freely in alcohol, ether and in a mixture of strong nitric and sulphuric acids. Its odor is very similar to that of oil of bitter almonds. It is obtained by treating benzol (C_6H_6) with warm fuming nitric acid, when 1 equivalent of the hydrogen is replaced by 1 of the radical NO_2, so that the benzol (C_6H_6) becomes converted into nitro-benzol ($C_6H_5NO_2$). It was first prepared by Mitscherlich in 1834, and called by him nitro-benzine.

Nitro-Benzol is a strong narcotic poison. Under the name of *Essence of Mirbane*, or artificial oil of bitter almonds, it is used, as a substitute, for oil of bitter almonds in cheap soaps, perfumery, and confectionery, giving to confectionery the smell, but not the agreeable taste of that oil. Its use for such purposes has diminished and practically ceased as regards confectionery and foods, by reason of legal restriction. It is a pale, lemon-colored liquid, with pungent, disagreeable taste, and distinguishable by its odor from all other liquids, except oil of bitter almonds, from which it may be distinguished in the following reaction: Pour a few drops of each on a plate, and add a drop of strong sulphuric acid. The oil of almonds acquires a rich crimson color with a yellow border, while the nitro-benzol produces no such color. In 1859, Prof. Casper of Berlin published an account of this liquid under the name 'A New Poison,' and described its effects on dogs and rabbits. Since that date, various cases of human poisoning have been published in more than one country. Its effect is that of a narcotic poison, producing a slow intoxication ending in stupor and death. Cases of serious illness are said to have been caused by the inhalation of the vapor from soaps perfumed with it. The remedial treatment after poisoning by this substance is essentially the same as in poisoning by opium. Its most important present use is as a step in the preparation of aniline (q.v.).

NITROGEN, n. *nī'trō-jĕn* [Gr. *nitron*, a mineral alkali; *gennăō*, I produce; from its being an essential constituent of nitre]: elementary body which, as a gas, composes about four-fifths by bulk of our atmosphere. NITROGENIZED, a. *nī-trŏj'ĕ-nīzd*, containing nitrogen as a constituent part. NITROGENOUS, a. *-nŭs*, or NITROGENEOUS, a. *nī'trō-jē'nĕ-ŭs*, pertaining to or containing nitrogen.

NITROGEN [symbol, N; at wt. 14·04] sp. gr. 0·9713, 0·9673 is frequently termed *azote* [Gr. *a*, priv., *zoe*, life], especially by French chemists, in consequence of its being a gas incapable of supporting life through breathing; and for the same reason, German chemists term it *stickstoff* ('choking substance'). It was discovered by

NITROGEN.

Rutherford 1772. Nitrogen belongs in Group V. of the elements as arranged according to the Periodic Law (q. v.). It is liquified at -319.9° F. (-195.5° C.), and solidified at -346.9° F. (210.5° C.).

Nitrogen is a colorless, tasteless, inodorous gas, which in appearance in no way differs from atmospheric air, of which it is the main ingredient. It is characterized rather by negative than by positive properties. It is not combustible, nor is it a supporter of combustion (a lighted taper being immediately extinguished if immersed in this gas); it is not respirable, though it is not positively poisonous; for when it is mixed with respirable gases (as with oxygen in atmospheric air) it may be breathed without injury. It is very slightly soluble in water, and hence may be collected over that fluid. Its combining powers are very slight, and though it unites with oxygen, hydrogen, chlorine, and many other substances, the union is effected rarely by direct action of the elements on one another, but only by complicated processes, and many of the resulting compounds are exceedingly unstable. By reason of this great instability, the compounds of nitrogen are of great value in the manufacture of explosives; and are peculiarly fitted to be constituents of vital organisms, making possible those perpetual changes on which life depends.

Nitrogen is one of the most widely diffused elementary substances. It forms about four-fifths of the bulk of the atmosphere; for air, after having been freed from the small quantities of carbonic acid and aqueous vapor which it contains, consists, according to the experiments of Dumas and Boussingault, of 20·81 per cent. of oxygen and 79·19 per cent. of nitrogen by volume, or 23·01 of oxygen and 76·99 of nitrogen by weight. The nitrogen of the atmosphere has recently been found by Sir Wm. Ramsey and Lord Rayleigh to contain 1 per cent. of argon (q. v.) and other gases still more inert than itself. The gases in this case are uniformly mixed, but not in chemical combination with one another. Nitrogen occurs, however, in combination with oxygen in the form of nitric acid (HNO_3) in various nitrates found as natural products in many parts of the globe. In combination with hydrogen, it is abundantly found as ammonia; and combined with oxygen, hydrogen, and carbon, and sometimes additionally with sulphur and phosphorus, it forms the most important constituents of the solids and fluids of the animal body, and occurs in many vegetable products, especially in the alkaloids, e.g., morphine, strychnine, and quinine.

The ordinary methods of preparing and exhibiting this gas are based on the removal of the oxygen from atmospheric air. This may be done (1) By setting fire to a small piece of phosphorus placed in a capsule, that floats on the water of the pneumatic trough, and by inverting a glass receiver filled with air over it. The phosphorus combines with the oxygen of the air to form phosphoric oxide, which dissolves in the water, while the

nitrogen is left, and may be transferred to another vessel. (2) By placing a stick of phosphorus in a jar of air which is standing over water. In two or three days there will be the same results as in the former experiment—viz., phosphoric oxide and nitrogen. (3) By passing air through a tube containing heated copper filings which absorb the oxygen. In the above cases, one per cent. of argon and other inert gases remains; a little carbonic acid is also present, which may be removed by passing the gas through a solution of potash. Pure nitrogen may be obtained directly by the action of chlorine gas on a solution of the nitrogenous substance, ammonia (NH_3).

Nitrogen forms with oxygen no less than five distinct compounds, containing, respectively, 1, 2, 3, 4, and 5 equivalents of oxygen, with 1 equivalent of nitrogen. These compounds are thus named and constituted: Protoxide of Nitrogen (known also as Nitrous Oxide and Laughing Gas), N_2O; Binoxide (or Deutoxide) of Nitrogen (known also as Nitric Oxide), N_2O_2; Nitrogen trioxide, N_2O_3; Nitrogen tetroxide (known also as Peroxide of Nitrogen), N_2O_4; Nitrogen Pentoxide, N_2O_5.

It will be noticed that two atoms of nitrogen are introduced into each. This is done in some cases irrespective of the specific gravity of the oxide in the gaseous state in order to avoid the anomaly of considering nitrogen a monad, dyad, triad, tetrad, and pertad. Admitting the possibility of one element thus varying in atomicity, which in this case has much in its favor, the oxides should be thus expressed: N_2O, NO, N_2O_3, N_2O_4, N_2O_5. The first, third, and fifth of these oxides in combination with water form hyponitrous acid ($H_2O+N_2O=2HNO$), nitrous acid ($H_2O+N_2O_3=2HNO_2$), and nitric acid ($H_2O+N_2O_4=2HNO_3$).

Nitrous oxide is a transparent, colorless gas, with sweetish taste and smell. It is much more soluble in cold than in hot water, and therefore should be collected over the latter. Under a pressure of 30 atmospheres at 32° F. (0° C.), it is reduced to a colorless liquid, and it may be frozen into a transparent solid at about -146° F. (-99° C.). This gas is about half as heavy again as atmospheric air, its specific gravity being 1·527. It supports the combustion of many bodies, such as carbon, sulphur, phosphorus, and iron, with a brilliancy similar to that which they exhibit in oxygen; and, like oxygen, when mixed with hydrogen, it forms a mixture which explodes on application of flame. The most remarkable property of the gas is its intoxicating power on the animal system. It may be respired for a short time if quite pure, or if mixed with atmospheric air, or for a longer time if mixed with oxygen, without danger or serious inconvenience. The intoxication is frequently accompanied with an irresistible propensity to muscular exertion, and usually with uncontrollable burst of laughter; hence the gas has received the name *laughing gas*. It is best obtained by heating solid nitrate of ammonia

in a glass retort, when it is converted into protoxide of nitrogen and water. It is extensively used as an anesthetic in dentistry and surgery. It is less suited to protracted operations, as the effects are transient, but when oxygen is administered with it, the anesthesia may be greatly prolonged without danger. It produces much less disturbance of the system than chloroform, though in some rare cases, or states of the system, its use is deemed injurious.

Binoxide of Nitrogen is a colorless gas, very slightly soluble in water, and having a specific gravity of 1·039. Its taste and smell (if any) are unknown, since, in the presence of atmospheric air, it instantly becomes more highly oxidized, and forms yellowish-red fumes of nitrogen tetroxide. It is of little importance.

Nitrogen trioxide is a substance of which, in its uncombined state, very little is known further than that it is a dark-blue, very volatile fluid, which boils at 32° F. (0° C.), and is then converted into an orange-red gas.

Nitrogen tetroxide presents a remarkable example of a body within comparatively small limits of temperature occurring in a solid, a fluid, and a gaseous form. At a temperature of -4° F. (-20° C.) it occurs in the form of colorless prismatic crystals, which are converted at about 14° F. into a fluid which, till the temperature reaches about 30°, is colorless; but at a higher temperature becomes yellow and orange, and at about 82° boils, and is converted into brownish-red vapor. It is chiefly the vapor of hyponitric acid that forms the orange fumes produced when binoxide of nitrogen comes in contact with the air. It possesses a very disagreeable suffocating odor, and a caustic action; and colors the skin yellow, like nitric acid. It does not enter into combination with bases, but is immediately decomposed by them into nitric and nitrous acid radicals.

Nitric Acid, see that title.

Nitrogen combines with hydrogen in four proportions, but none of these compounds can be formed by the direct union of the component elements, and only one, ammonia, has been obtained in the isolated form. They are—*Imidogen* (NH), *Amidogen* (NH_2), *Ammonia* (NH_3), and *Ammonium* (NH_4). For the first two, see ORGANIC BASES: for the last two see AMMONIA.

Nitrogen combines with chlorine, bromine, and iodine. The *chloride of nitrogen* is a heavy, oily, orange-colored fluid, insoluble in water, and evolving a vapor highly irritating. It is one of the most dangerous compounds known in chemistry, as it explodes with extreme violence when exposed to dust, sunlight, or the light of burning magnesia, or when brought in contact with wood, grease, oil, or almost any kind of organic matter, at ordinary temperatures; and spontaneously, when heated to above 200° F. It has occasioned many serious accidents; details regarding its mode of preparation are omitted here. Its exact formula is unknown. *Bromide of Nitrogen* is an oily-looking detonating liquid, resembling the

chloride in appearance and properties. *Iodide of Nitrogen* occurs as a black powder, which when dry explodes at the slightest touch, often without any assignable cause.

Nitrogen enters into combination with various metals, as mercury, copper, titanium, molybdenum, and vanadium, forming a class of compounds to which the term *Nitrides* is applied. Their most marked characteristic is, that, like the preceding set of compounds, they are highly explosive, resolving themselves when struck, or at a high temperature, into their constituent elements.

Nitrogen is absolutely essential to plant life and growth. It forms one of the principal and most costly elements of commercial fertilizers (see FERTILIZERS), and in soils long under cultivation is very likely to be deficient in quantity. Concerning the sources whence it is obtained by certain plants there has been much mystery. Experience has proved that the growth and yield of wheat and other cereals which contain only a moderate quantity of nitrogen are greatly increased by the use of nitrogenous manures, while clover, alfalfa, and other leguminous crops, though using large quantities of nitrogen, do not show such marked benefit from the application of these fertilizers, and thrive with the application of less than the cereals require. It has been conclusively shown also that though leguminous crops remove considerable quantities of nitrogen from the land, they leave the surface soil richer in that element than it was before they were produced. Only two sources of this surplus nitrogen are possible—the subsoil and the atmosphere. For a long period many farmers claimed that both these sources were drawn upon, while scientists declared that the nitrogen not furnished by the rainfall or by fertilizers, or not already existing in the soil must come only from the subsoil. Some years ago Prof. Hellriegel, of Germany, initiated a series of elaborate experiments which have proved that leguminous crops obtain much of their nitrogen from the air. Sir J. B. Lawes, who long opposed the theory that plants could use free nitrogen, repeated the tests at his famous experimental estate, Rothamsted, England, with results corroborating those obtained by the German chemist. Since then elaborate and extensive experiments have been conducted at various agricultural stations in the United States and European countries; and it is now satisfactorily proved that leguminous plants have the power of absorbing and fixing the nitrogen of the atmosphere. This is accomplished by means of bacteria which form nodules on the rootlets. The micro-organism has been identified and artificially cultivated, and preparations have been put on the market under the name of *Nitragin*. Experiments have been for a few years past, and now are, under way, to determine whether or not the yield of leguminous plants can be increased by inoculating the soil with the culture; also whether the yield of grain and other crops may be increased by turning the green legumes into the soil.

NITROGLYCERIN.

NITROGLYC'ERIN, or GLONOIN: a powerful explosive discovered by Ascanio Sobrero in 1846, and first produced commercially by Emmanuel and Alfred B. Nobel, at Helenborg, Sweden, in 1862. The process of manufacture was much improved by George M. Mowbray of North Adams, Mass., and Walter N. Hill of the U. S. Torpedo Station, at Newport, R. I., these improvements yielding a product of greater purity, and also overcoming many of the dangers attending the manufacture, transportation and use of the substance. Nitroglycerin is manufactured by treating glycerin with a mixture of concentrated nitric and sulphuric acids, but the proportions of the material used and the methods of operation are different in different countries. In the United States the acids are usually mixed in the proportion of 2 parts by weight of nitric to 3 parts by weight of sulphuric, so as to contain 61.9 per cent. of real H_2SO_4, 34.5 per cent. of HNO_3, and not more than 0.7 per cent. of N_2O_3. These 'mixed acids' are shipped from the acid works in iron drums holding 1,500 pounds each, this weight being a convenient charge for one run in the nitroglycerin converter. The 'converter' or 'nitrator' is a closed cylindrical vessel of lead, standing within a wooden one. The mixed acids are introduced by a pipe at the top of the converter, and the glycerin is forced into the vessel at the bottom, by means of compressed air. The fumes produced by the reaction are carried off through a 'fume pipe,' which is provided with a window to view the gases. The reaction between the glycerin and the acids causes the evolution of considerable quantities of heat; and to prevent the temperature of the converter from rising to the danger point, cold water is continually passed through the space between the lead cylinder and the wooden one, and also through a cooling coil of lead pipe, which is placed within the lead cylinder. Compressed air is also injected directly into the mixture to aid in the cooling, and extra air pipes are provided, for use in case the rise of temperature cannot be controlled by the means that are normally sufficient. The temperature of the mixture is continuously observed, by means of sensitive, specially constructed thermometers, which enter the converter through the top. In operating the process, the mixed acids are run into the converter first, the cooling water is next turned on, and lastly, the glycerin is slowly introduced at the bottom. When the materials are pure, and no particle of water is allowed to enter the mixture, and the temperature is not permitted to rise above 86° F., this part of the operation may be regarded as reasonably safe.

When the conversion is completed, the charge of the converter is run off into a 'separator,' which is a cylindrical leaden vessel provided with windows, with a vent pipe for the escape of vapors, and with an injector pipe, through which compressed air may be introduced for cooling purposes, in case any tendency toward rise of temperature is observed. When the charge is allowed to

stand, the nitroglycerin rises to the top of the separator, and the spent acids, by reason of their greater density, sink to the bottom. The separation being, nearly complete, the nitroglycerin is drawn off through an upper spigot, and the spent acids are drawn off at the bottom and passed to a second separator, for the removal of the last traces of nitroglycerin that they contain. The nitroglycerin is now repeatedly washed with water, then with a solution of soda ash, and again with water, until the last traces of acid are removed from it. The spent acids are sent to the 'regaining' works, where the sulphuric acid (which is not destroyed in the process) is recovered for further use. The small quantity of nitric acid that remains unused is also recovered in a dilute form, and used for other purposes. Theoretically, 100 parts by weight of glycerin should yield 246 parts of nitroglycerin; but the yield in the United States is only from 200 to 220 parts.

Nitroglycerin is also known as 'glonoin,' 'Nobel's blasting oil,' and 'trinitroglycerin.' It was originally supposed to be a nitro-substitution compound, like many other substances produced by the action of nitric acid upon organic compounds, and hence the name it now commonly bears. But Berthelot has shown that its reactions are those of a salt or ester of nitric acid, and its correct chemical name is now admitted to be 'glyceryl trinitrate,' or 'propenyl trinitrate.' 'Glyceryl' or 'propenyl' is the name of the organic radical C_3H_5, and ordinary glycerin, $C_3H_5(OH)_3$, is the hydrate of this radical. Nitroglycerin has the formula $C_3H_5(NO_3)_3$, and is formed from nitric acid and glycerin in accordance with the equation $C_3H_5(OH)_3 + 3HNO_3 = C_3H_5(NO_3)_3 + 3H_2O$.

When chemically pure, glyceryl trinitrate is a colorless, odorless, transparent, oily liquid, but commercial nitroglycerin varies in color between a hock-wine and a dirty yellow. It has a specific gravity of 1.599 when liquid, and 1.735 when frozen. It freezes at 46° F. if exposed for a long time to this temperature, forming long, whitish crystals, which melt again upon prolonged exposure to a temperature of 52° F. According to Hess it volatilizes completely upon continuous exposure to a temperature of 158° F., and Guttmann has found that dynamite (q.v.) will lose 10 per cent. of its nitroglycerin by an exposure of several days to a temperature of 104° F. Nitroglycerin is almost insoluble in water, but dissolves readily in wood alcohol, grain alcohol, ether, benzene, and many other organic liquids. It undergoes dangerous decomposition with explosion upon contact with sulphuric acid (except under the conditions of manufacture described above), and it is also decomposed by alkalies and by alkaline sulphides. The safest way to destroy it is by treating it with a solution of ammonium sulphide, or, where the quantity is large, with spent lime from the purifiers of gas works. Nitroglycerin has a sweetish, burning taste, and is poisonous, producing

extremely violent headaches when taken by the mouth, absorbed through the skin, or inhaled as vapor; though some persons, by constant association with it, become immune to its physiological effects. The antidotes are cold compresses, fresh air, black coffee, and morphine. It is used in medicine as a heart stimulant, in the treatment of angina pectoris, in the revival of the drowned, and as an antidote in cases of poisoning by carbon monoxid and water gas.

The critical temperature of decomposition of nitroglycerin is between 113° F. and 122° F. At 113° F. it keeps indefinitely if free from acid, but between that temperature and 122° F. it begins to decompose, and at 160° F. decomposition goes on actively. Pure nitroglycerin is not very sensitive to friction or moderate percussion, except when pinched between metallic surfaces, or struck a glancing blow. If placed upon an anvil and struck with a hammer, only the particle struck, as a rule, explodes, the remainder being scattered; but this is an unsafe experiment to try with a quantity of the explosive, because in some cases the whole mass will be exploded. Frozen nitroglycerin is in general less sensitive to shock than the liquid, but explosions have occurred which were believed to be due to the breaking of a crystal of the solid substance. When a small quantity of nitroglycerin is freely exposed to a flame, it burns brilliantly and without explosion; but when the experiment is tried with a larger quantity, explosion is likely to follow. A drop of nitroglycerin, when placed upon an iron plate and slowly heated, may volatilize completely without exploding; and if the drop is placed on an iron plate that is previously heated to incandescence, it will assume the spheroidal condition and volatilize without explosion; but if the plate be heated to a temperature just below incandescence the drop explodes violently upon contact with it. Nitroglycerin was at first exploded, in blasting, by means of a gun-powder fuse, and this method is still used to a limited extent with dynamite; but it is chiefly fired by means of a powerful detonator, by which its greatest explosive efficiency is realized.

Nitroglycerin is principally used in the manufacture of dynamite, explosive gelatine, gelatine dynamites, and smokeless powders such as ballistite and cordite. The liquid substance is used in torpedoes for oil wells, to remove the paraffin which clogs them or to shake the oil-bearing sandstone so as to secure a better flow of oil. Owing to the difficulty and danger of transporting and handling liquid nitroglycerin, attempts were early made to absorb the liquid by means of some substance which would not interfere with its explosive action, but which would form with it a solid body, or a powder, which could be handled more conveniently and safely. Many such absorbents have been tried, charcoal being the first; but Nobel found that a kind of infusorial earth, consisting chiefly of the silicious remains of diatoms, and known as 'kieselguhr,' is much superior to charcoal, and

this substance is now largely used as an absorbent, in the manufacture of common 'dynamite.' Sawdust, especially in combination with certain chemical substances, is used as an absorbent to a considerable extent. 'Dualin,' for example, is a mixture of 50 parts of nitroglycerin, 30 of sawdust, and 20 of saltpeter, and 'Atlas powder' and 'Hercules powder' consist of nitroglycerin, carbonate of magnesia, wood fibre, and sodium nitrate. 'Blasting gelatine,' invented by Alfred Nobel, consists of nitroglycerin gelatinized by the addition of nitrated cotton fibre; its manufacture being based upon the fact that a mixture of mononitro-cellulose and dinitro-cellulose, when free from unnitrated cotton and from trinitro-cellulose ('gun-cotton') dissolves in warm nitroglycerin with the formation of a gelatinous substance.

NITRO-MAGNESITE, n. *nī'trō-măg'nĕ-sīt* [Gr. *nitron*, a mineral alkali, and *Magnesia*, in Asia Minor]: nitrate of magnesia, a saline efflorescence closely resembling nitrate of lime.

NITROMETER, n. *nī'trŏm'ĕ-tėr* [Gr. *nitron*, a mineral alkali; *metron*, a measure]: an instrument for testing the quality or value of nitre.

NITRO-MURIATIC ACID, *nī-trō mū-rĭ-ăt'ĭk ăs'ĭd:* mixture of nitric and hydrochloric acids. It has the power of dissolving gold; hence was termed *aqua regia* by the alchemists. It dissolves platinum also. Its solvent power depends on the liberation of chlorine in what is called the nascent state. Chloride of the metal is formed also of nitrosyl (NO). The mixed acids must be strong; if dilute, must be heated. The colorless fuming mixture soon becomes an orange yellow from the liberation of chlorine. It destroys organic matter, and is used in investigating poisons.

NITROUS, a. *nī'trŭs* [from NITRE, which see]: resembling or obtained from nitre; impregnated with nitrous acid. NITROUS ACID, a compound of nitrogen and oxygen, with less oxygen than nitric acid (see NITROGEN). NITROUS OXIDE, the gas known by the name of laughing gas.

NITROUS ETHER, *nī'trŭs ē'thėr*, or NITRITE OF OXIDE OF ETHYL, represented by the formula $C_2H_5NO_2$: pale yellow fluid, having a specific gravity of 0·947, and evolving an agreeable odor of apples. On evaporation, it produces a great degree of cold, it boils at 62° F., and it is very inflammable. It does not mix with water, but is readily miscible with alcohol. When kept in contact with water it soon decomposes; and an acid mixture of a very complicated character is formed. N. E. may be obtained by mixing 1 part of starch and 10 of nitric acid in a capacious retort, gently heated. The vapor of nitrous acid, evolved by the action of the starch on the nitric acid, is conducted into alcohol, mixed with half its weight of water, contained in a two-necked bottle, which is to be plunged into cold water. The second neck of this bottle is connected with a good cooling apparatus; and the vapor combining in its passage through the alcohol with the oxide of ethyl, forms nitrous ether. This, known

as Liebig's method, is the best; but N. E. is prepared usually by the direct action of nitric acid on alcohol, in which case the nitric acid is deoxidized by the hydrogen and carbon of the ethyl of part of the alcohol.

The *Spirit of Nitrous Ether*, or *Sweet Spirit of Nitre*, used in medicine, is a mixture of nitrous ether with about four times its volume of rectified spirit, mixed with some aldehyde and other impurities. Its specific gravity should not exceed 0·85. It is used, in conjunction with other medicines, as a diuretic, especially in the dropsy which follows scarlatina; and it is employed, in combination with acetate of ammonia and tartarized antimony, in febrile affections. The dose in febrile cases is from half a drachm to a couple of drachms, and if it is to act as a diuretic, two or three drachms should be given. Being a rather expensive medicine, it is liable to adulteration. In the new British Pharmacopœia, it is recommended that this substance should be directly obtained by the distillation of nitrite of soda (five ounces), sulphuric acid (four fluid ounces), and rectified spirit (two pints)—a process open to many practical objections.

NITTER, n. *nĭt'tĕr* [from Nit, which see]: the horse louse or fly which deposits nits on horses.

NITZSCH, *nĭtsh*, Karl Immanuel: German theologian: 1787, Sep. 21—1868, Aug. 21; b. Borna, Saxony; son of Karl Ludwig N., pastor and afterward professor. He studied for the clerical profession at Wittenberg, where he took his degree 1810, and where, 1813, he became parish minister. Here his religious opinions underwent great modification through the influence of Schleiermacher and Daub, and he awoke to a clearer perception of the essence of religion. From this time forward N. is to be regarded as one of that new school—of which Neander is the greatest representative—who endeavored to reconcile faith and science, not by forced and unnatural compromise, but by pointing out their distinctive spheres, and by exhibiting in their own spiritual life that union of reason and reverence for which they argued in their writings. In 1822, N. was called to Bonn as ordinary prof. of theology and university preacher: there he labored with great diligence more than 20 years, not only in theology, but in all matters affecting the welfare of the Prussian church. In 1847, he succeeded Marheineke at Berlin, and as prof., university preacher, and upper consistorial councilor, he exercised with prudence and moderation a wide ecclesiastical influence. In his political (perhaps also in his religious) views he may be classed with Chevalier Bunsen. The High Lutheran party having denounced liberal politics as irreligious, N. and Bunsen and others have vindicated them on the ground of Christianity, not without success. In theology, N's position as protesting against the frequent usurpation by dogma of the supreme place in Christianity, is indicated by his subordination of dogma to ethics, or rather by his belief that the only dogmas which can maintain themselves permanently are those that result from an ethical apprehension of Christianity

Besides numerous smaller treatises on Dogmatics, the History of Dogmas and Liturgies, three larger works call for special mention. These are *System der Christlichen Lehre* (Bonn 1829); 6th edit. (1851); *Praktische Theologie* (Bonn 1847–8); and *Predigten*, or Sermons, of which several collections have appeared, remarkable for richness of thought. —His brother GREGOR WILHELM N. (1790–1861), acquired high reputation as a philologist, and was prof. of archeology at Leipzig. He was considered one of the ablest opponents of Wolf's Homeric theories. His chief work is *Die Sagenpoesie der Griechen* (Brunswick 1852).

NIVELLES, *nē-vĕl'* (Flem. *Nyvel*): town of Belgium, province of Brabant, 18 m. s. of Brussels. It has a fine church, the Church of St. Gertrude (in Romanesque architecture, A.D. 1048), which claims to contain in a shrine over the high altar the relics of St. Gertrude, daughter of Pepin, Maire du Palais. N. has manufactures of linen, cotton, lace, etc. Pop. 11,650.

NIVEOUS, a. *nĭv'ē-ŭs* [L. *nivĕŭs*, white as snow—from *nix*, snow]: snowy; resembling snow.

NIVERNAIS, *nē-vĕr-nā' :* formerly a province in central France, corresponding nearly to the present dept. of Nièvre. It was divided into eight territorial districts, and its towns had municipal privileges at a very early period. The principal landowners were the counts, afterward dukes, of Nevers, who held under their vassalage more than 1,800 fiefs.

NIVOSE, *nē-vōs'* [F. snowy : Latin, *nivosus*—from *nix*, snow]: name adopted, 1793, Oct., by the French Convention for the fourth month of the republican year; beginning Dec. 21, the first winter month.

NIX, *nĭks*, fem. NIXE [OHG. *nihhus;* Anglo-Saxon, *nicor;* Dutch, *nikker;* Old Norse, *nikr;* Swed. *näk*, *nek;* Dan. *nök*, *nok*—whence our name for the devil, *Nick*, not as some absurdly suppose, from *Nicholas* Machiavelli]: common name for all water spirits in the Teutonic mythology. They are represented as of human form, sometimes passing into that of a fish or of a horse. They love music and dances, and possess the gift of prophecy, like the Greek Muses, Sirens, and other water gods. The nix taught, in return for a good gift, the art of playing on a stringed instrument; and often in the evening sunshine the nixes, combing their long hair, were wont to mingle in the dances of mortals; but their company was dangerous, for though sometimes wearing a mild appearance, they were more frequently cruel and malignant.—The *water-kelpie* of Scotland must be reckoned a member of the genus Nix, but in him the evil element alone exists. He generally, if not always, assumed the form of a water-horse; frequented fords and ferries, especially during storms; allured travellers to mount him and then dashed furiously with them into the stream which he had flooded by his devilish power, and submerged them.

NIZAM, n. *nĭ-zâm' :* the title of one of the native sovereigns of India—principal Mohammedan ruler in India.

NIZAM'S DOMINIONS, *nĭ-zâmz'*, or HAIDARABAD *hī-da-râ-bâd':* most important of the native or feudatory states of India, occupying the greater part of the Deccan proper or central plateau of s. India, between the provinces of Madras and Bombay; 81,807 sq. m. (excluding the British assigned districts of BERAR, q.v.) The surface is a slightly-elevated table-land. The principal rivers are the Godavari (Godavery), with its tributaries the Dudhna, Manjera, and Pranhita; and the Kistna (Krishna), with its tributaries the Bimah and Tungabhadro. The soil is naturally very fertile, but poorly cultivated; yet, wherever it receives moderate attention, it yields harvests all the year round. The products are rice, wheat, maize, mustard, castor-oil, sugar-cane, cotton, indigo, fruits (including grapes and melons), and all kinds of kitchen vegetables. The pasturages are extensive, and sheep and horned cattle are numerous. Marsh and jungle, however, occupy a great space, and originate fevers, agues, diseases of the spleen, etc., though the climate is quite healthful where these do not abound. The mean temperature of the cap., Hyderabad, in Jan. is 74° 30′, and in May 93°. The inhabitants manufacture for home use woolen and cotton fabrics, and export silk, dressed hides, dye-stuffs, gums, and resins. The Nizam is a Mohammedan, but his subjects are mostly Hindus. His revenue is about $20,000,000 a year; and he maintains an army of 30,000 foot and 8,000 cavalry. See JANG, SIR SALAR.

In 1687, the territory, now known as the N. D., became a province of the Mogul empire; but 1719, the gov. or viceroy of the Deccan, Azof Jah, made himself independent, and took the title *Nizam-ul-Mulk* (Regulator of the State). After his death, 1748, two claimants appeared for the throne, his son Nazir Jung, and his grandson Mirzapha Jung. The cause of the former was espoused by the E. India Company, and that of the latter by a body of French adventurers under General Dupleix. Then followed a period of strife and anarchy. In 1761, Nizam Ali obtained the supreme power, and after some vacillation signed a treaty of alliance with the English 1768. He aided them in the war with Tippoo, Sultan of Mysore, and at the termination of that war, 1799, a new treaty was formed, by which, in return for certain territorial concessions, the E. India Company bound itself to maintain a subsidiary force of 8,000 men for the defense of the N. D. The Nizam remained faithful to the British during the mutiny of 1857–8. The territory is frequently called Hyderabed or Haidarabad (q.v.). A British resident advises the Nizam. Pop. of N. D. (excluding the Brit. assigned districts of Berar) (1881—first census ever taken) 9,845,594; (1891) 11,537,040; (1901) 11,141,142.

NIZH'NI-NOVGOROD': see NIJNI-NOVGOROD.

NIZH'NI-TAGILSK': see NIJNI-TAGILSK.

NO., pronounced *nŭm'bĕr:* the common commercial abbreviation of *number* [It. *numero*—from L. *numerus*].

NO, ad. *nō* [AS. *na;* Skr. *na;* Pers. *nah,* no, not (see NAY)]: a word of denial or refusal; expressing a negative; the opposite of *yes; no* is emphatic after another negative—as, 'there is *none* righteous, *no,* not one': N. a refusal; a denial; a negative vote, generally in the plural, the negative voters, as the NOES [*nōz*] have it: see AY.

NO, a. *nō* [an abbreviation of *none:* L. *non,* not]: not any; not one; none. NO EFFECTS, a return to a writ or attachment when there can be found no property upon which to levy. *Note.*—Before the comparative degree, *no* may be regarded as an adjective or an adverb, the word 'time' or the like being understood in the former case, and signifies 'in no respect or degree; not at all,' as *no* higher, *no* longer, *no* shorter, *no* more.

NOACHIAN, a. *nō-ā'kĭ-ăn:* pertaining to the patriarch *Noah* or his deluge. NOACHIDÆ, n. plu. *nō-ăk'ĭ-dē* [from *Noah,* and the patronymic termination *dæ,* signifying descendants]: the immediate families or tribes descended from Noah, or from Shem, Ham, and Japheth.

NOACHIAN PRECEPTS: seven canons or laws which, according to the Talmud, were given by Jehovah to the sons of Noah. These precepts are analogous to what among the Romans was classed as Natural Law or *Jus Gentium,* a code revealed by the consensus of conduct among the Mediterranean nations. The seven Noachian Precepts enjoin: 1. Submission to civil authorities, kings, judges, etc. 2. Avoidance of idolatry and sacrilege. 3. Reverence to the name of God, as in taking an oath. 4. Proper restraint and direction of the human sexual instinct. 5. Reverence for life, even of animals, by refusing to consume the blood of beasts as food. 6. Respect for the rights of property. 7. Refusal to eat the member of a living animal. The expanding and refining genius of the Rabbins sometimes adds four others to these seven, namely: 1. The blood of a living animal is not to be drawn for the purpose of drinking it. 2. Animals are not to be mutilated. 3. Magic and sorcery are unlawful. 4. The crossing of animals and grafting of trees are also unlawful. No stranger was allowed to dwell in Hebrew territory unless he conformed to the Noachian Precepts and became a 'proselyte of the gate'; in contradistinction to the strangers who conformed by being circumcised, and were styled 'proselytes of righteousness.'

NOACK, *nō'âk,* AUGUST: German painter: b. Darmstadt 1822. After painting under Sohn, Lessing and Schadow, in the Düsseldorf Academy (1839-42), he continued his student life in Munich and Antwerp, but eventually settled in his native town 1855, where he was made court painter and professor at the Polytechnic. He has painted several fine altar-pieces, and his *Visit of Landgrave Philip the Magnanimous to Luther* (Rostock Gallery) and *The Disputation at Marburg* (Darmstadt Gallery) give him high rank as a painter of historical pictures.

NOAH, *nō'a*: according to the Hebrew Scriptures, the son of Lamech, and 10th in descent from Adam. He was the first ancestor of the new race of men who should people the earth after the flood, in which points he is the counterpart of the Chaldaic Xithuthros, the Hindu Prithu, and the Greek Deucalion, severally. We read nothing of him from his birth till he is 500 years old, when we are told that he begat three sons, Shem, Ham, and Japheth. Having been warned by God of the coming flood, he built an ark or great vessel by the direction of Jehovah, into which he entered with his family and all kinds of animals of every kind. After the waters had subsided the ark rested on Mount Ararat, where Noah offered a burnt-offering to God, and was assured that the earth should never again be destroyed by a flood. This is the first passage in the Bible where altar or burnt-sacrifice is mentioned. As a sign of this covenant with Noah, God set the rainbow in the clouds. Noah died at the age of 950 years, 350 years after the flood. The narrative marks several important points in the history of civilization. In agriculture, the recognition of such seasons as seed time and harvest; and the discovery of the vine, which is made such a salient point in Greek mythology; the institution of sacrificial worship; the institution of civil government. The Noachian Precepts (q.v.) are founded on Genesis ix. 1-17.

NOAH, Mordecai Manuel: American politician and journalist: b. Philadelphia 1785, July 19; d. New York 1851, March 22. Through the influence of Robert Morris he was appointed clerk in the auditor's office of the United States Treasury. On the removal of the national capital from Philadelphia to Washington, he resigned his clerkship, and was for a time reporter at the sessions of the Pennsylvania Legislature at Harrisburg. In 1813 he was appointed United States consul at Tunis, with a special mission to Algiers. Captured in the English Channel by an English warship, on July 3, 1813, he was detained several weeks as a prisoner of war, and then released, next proceeding by way of Spain to his post of duty. He succeeded in ransoming the American prisoners whom the Algerians held in slavery, but was recalled on the pretext that his religion was incompatible with his consular position at Tunis. He was abundantly vindicated later. In those days the United States paid a yearly tribute of $200,000 to Tunis for the privilege of navigating the Mediterranean. Noah denounced such payment, insisting that the money would be better spent in building warships. Returning home in 1819 and settling in New York city he published a volume of his *Travels in England, France, Spain and the Barbary States*, and founded the *National Advocate*. In 1822 he was elected high sheriff of the city and county of New York. After the discontinuance of the *National Advocate*, he began the *New York Enquirer*, which was merged with the *Courier* and became the *Courier and*

Enquirer, in partnership with James Watson Webb, but political differences soon dissolved their connection. Appointed by President Jackson surveyor of the port of New York, he established in 1834 the *Evening Star* and became judge of the court of sessions. In 1842 he started a daily, *The Union*, which became a weekly and under the title, *Noah's Sunday Times and Messenger*, was edited by him until his death. A most interesting project in which he engaged in 1820 was to re-establish the Jewish nation and form a place of refuge for Jewish emigrants on Grand Island, in the Niagara River, near Buffalo. In 1825 with impressive ceremonies, he laid the cornerstone of the proposed city at White Haven, but the new 'Ararat,' as it was termed, came to naught. Noah's literary activity was varied; it included a large number of addresses and essays, a translation of the *Book of Yashar*, and many plays, some of them popular in their time. He was ever broad-minded and charitable, and a picturesque figure of his time. Consult: Wolf, *Mordecai Manuel Noah: A Biographical Sketch* (1897); Morais, *Eminent Israelites of the 19th Century* (1886).

NOAH, Samuel: American soldier: b. London, England 1779, July 19; d. Mount Pulaski, Logan County, Ill., 1871, March 10. Of Jewish descent and a cousin of M. M. Noah (q.v.), at 20 he emigrated to America, and was appointed 1805, May 5, cadet in the 1st Regiment of Artillery. He was graduated 1807, Dec. 9, was promoted ensign in 2d Regiment and after desultory service in the Gulf States resigned (1811, March 13) his commission of 1st lieutenant in the army. He joined Magee's Mexican forces which were besieged at Fort Bama (1812, Nov. 14) by the Spanish royalists. On Magee's death, Noah in command of the rear-guard routed the enemy and captured San Antonio. War having been declared by the United States against England, Noah left Texas to re-enter the United States army, but on President Madison's refusal to re-commission him, volunteered as a private soldier to defend Brooklyn and served to the end of the war. At the time of his death he was the oldest graduate from West Point. Consult Cullom, *Biographical Sketches of Deceased Graduates of the U. S. Military Academy.*

NOAILLES, *nō-â'yė*, Louis Marie, Vicomte de: 1756, Apr. 17—1803, Jan. 9; b. Paris. He married a sister of the wife of Lafayette, became a major in the French army 1771 and was brevetted brig.gen. previous to 1779 when he came to the United States and rendered valuable assistance to the colonists in their war for independence. Returning to France he became a member of the states general, and 1789 introduced the famous measure abolishing titles, feudal privileges, and slavery in all French territory. He was pres. of the constituent assemby 1791, came to the United States 1793, became a lawyer, and made a fortune as a banker in Philadelphia. He took an important part in the war at San Domingo

1803, and was mortally wounded in a brilliant and successful engagement between a vessel which he commanded and an English war ship. He died at Havana.

NOB, n. *nŏb* [an abbreviation of English *noble* in its general application to a person of the higher class]: in *slang*, a person of superior position in life; a fop. NOB'BY, a. *-bĭ*, having the character of a nob; capital; neat; got up with care in matters of dress. See SNOB.

NOBBE, *nō'bĕ*, FRIEDRICH: German plant physiologist: b. Bremen, Germany, 1830, June 20. He was educated at Jena and Berlin, and in 1861 was called to a professorship at the Industrial School in Chemnitz. In 1868 he joined the faculty at the Academy of Forestry and Agriculture at Tharandt, where he founded an experiment station for plant physiology, and he originated, in 1869, scientific seed testing. He has published: *Wider den Handel mit Waldgrassamen für die Wiesenkultur* (1876); etc.

NOBEL, *nō'bĕl*, ALFRED BERNARD: b. Stockholm, Sweden, 1833, Oct. 21; d. San Remo, Italy, 1896, Dec. 10. He was the third son of Emmanuel, and in 1842 his father moved with his family to Saint Petersburg, Russia. In 1850 he sent Alfred to the United States to study under the famous engineer John Ericsson. On reaching his 21st year the son returned to Saint Petersburg trained as an engineer and moreover able to speak fluently Swedish, Russian, English, German, and French. Later he took up the study of chemistry and showed a marked preference for that science in its technical applications. Emmanuel Nobel went to Russia under contract to prepare mines and torpedoes for the Russian government, and erected on the Neva works for their manufacture which eventually were extended to include the manufacture of firearms and agricultural implements.

After Alfred returned from America he was constantly engaged with his father in pursuing some invention. Among other substances nitroglycerin especially occupied their attention, and finally in 1862 they had erected a works at Helenborg, Sweden, where nitroglycerin was manufactured on a commercial scale for the first time in its history. In 1864 the works were destroyed by an explosion which killed the chemist, and Alfred's younger brother Oscar, and the calamity so affected Emmanuel Nobel as to bring on a paralytic stroke which left him permanently crippled. Alfred Nobel immediately erected new works on a barge anchored in Lake Mälaren, and in 1865 enlisted capital to erect works on a large scale at Winterviken, Sweden, and Krümmel, Germany. So many accidents occurred with nitroglycerin, and especially the destruction of a vessel transporting it at Aspinwall on the Isthmus of Panama, attracted such attention, that its transportation was interdicted by many governments. In the latter part of 1866 Nobel discovered dynamite which replaced it and which was at once manufactured in his Swedish and German factories and in 1868 at a

factory which he started near San Francisco, Cal. In 1871 he erected at Ardeer, Scotland, the works which are now the largest dynamite works in the world. In fact, dynamite met with such acceptance that works sprang up in all civilized countries, and while in 1867 but 11 tons were made, in 1882, 9,500 tons were produced and in 1900 the United States alone manufactured 42,923 tons. In 1875 Nobel invented explosive gelatine and the gelatine dynamites. In 1888 he invented ballistite. Alfred Nobel was interested in many other arts than that of explosives, having taken out in England alone 129 patents. With his brothers Ludwig and Robert he formed in 1878 the famous firm of Nobel Brothers that operated the petroleum wells at Baku, Russia, and has proved the most active competitor of the Standard Oil Company. He also purchased the large ordnance works at Bofors, Sweden, that he might the more readily carry out his inventions in ordnance and his investigations in metallurgy. At his death he left an estate worth over nine millions of dollars, and in his will, after leaving small legacies to his already wealthy relatives, directed that the residue should constitute a fund the interest from which should be annually divided into five equal amounts and awarded as prizes to the person who shall have made, (1) the most important discovery or invention in the domain of physics; (2) in chemistry; (3) in physiology or medicine; (4) who shall have produced in the field of literature the most distinguished work of an idealistic tendency; and (5) who shall have most or best promoted the fraternity of nations, the abolishment or diminution of standing armies and the formation and increase of peace congresses. Prizes (1) and (2) are awarded by the Royal Academy of Science in Stockholm; (3) by the Caroline Medical-Chirurgical Institute in Stockholm; (4) by the Swedish Academy in Stockholm, and (5) by the Norwegian Storthing (Parliament). The statutes approved by King Oscar of Sweden require among other conditions 'that every candidate for a prize . . . be proposed as such in writing by some duly qualified person. A direct application for a prize will not be taken into consideration.' 'Every written work, to qualify for a prize, shall have appeared in print.' 'No work shall have a prize awarded to it unless it has been proved by the test of experience or by the examination of experts to possess the pre-eminent excellence that is manifestly signified by the terms of the Will.' The announcements of the awards are made on December 10.

The will was contested by heirs, but a compromise was effected on condition that a portion of the property be devoted to the founding of institutions for research known as Nobel Institutes, which has been done. The income from the residue of the estate permits, however, of five prizes, each approximating closely to $50,000 in value, being awarded annually. Awards were made for the first time 1901, Dec. 10, prizes being given in physics to Wilhelm Conrad Röntgen of Munich, discoverer of the

Röntgen rays; in chemistry to Jacob Henry Van't Hoff of Berlin, founder of the science of stereochemistry; in physiology and medicine to Emil von Behring, discoverer of diphtheria serums; in literature to Armand Sully-Prudhomme of Paris (d. 1907), author of *Justice* (1878) and other poems, and *De l'expression dans les beaux-arts* (1884) and other prose works. The prize for peace was divided between Henri Dunant of Switzerland, prime-mover of the Geneva Convention and of the Red Cross societies, and Frederic Passy, founder of the Universal Peace Union.

The prizes for 1902 were awarded in physics jointly to H. A. Lorentz and P. Zeeman of Holland for researches on radiant energy; in chemistry to Emil Fischer of Berlin for syntheses of sugars; in physiology and medicine to Donald Ross of Liverpool for the discovery of the dissemination of malaria by the mosquito; in literature to Theodore Mommsen of Berlin (d. 1903) for his works on Latin inscriptions and Roman history; and for peace to Frederick de Martens of Russia for promoting the Hague Conference and the Venezuelan Arbitration. The peace prize may be awarded to an institution or association as well as to individuals.

The prizes for 1903 were awarded in physics jointly to A. H. Becquerel, P. Curie (d. 1906) and Marie Curie of France, in chemistry to S. Arrhenius of Sweden; in medicine to N. R. Finsen of Denmark (d. 1904); in literature to B. Björnson of Norway; and for peace to W. R. Cremer of England.

The prizes for 1904 were awarded in physics to Lord Rayleigh of England; in chemistry to Sir William Ramsay of England; in medicine to Dr. Paõloff of Russia; in literature jointly to Frederic Njistral of France and José Echegaray of Spain; and of peace to the Institution of International Law, the first award to an institution.

In 1905 the prizes were awarded in physics to Prof. Philipp Leonard of Kiel University, Germany; in chemistry to Adolph von Boeyer of Germany; in medicine to Dr. Robert Koch of Germany; in literature to Henryk Sienkiewicz of Poland; and of peace to the Baroness von Suttner of Austria.

In 1906 the prizes were awarded in physics to Prof. J. J. Thomson of the University of Cambridge, England; in chemistry to Henri Moissan of France (d. 1907); in medicine jointly to Prof. Ramon y Cojal of Spain and Prof. Golgi of France; in literature to Giosuè Carducci, the Italian poet (d. 1907); and for peace to Theodore Roosevelt, President of the United States.

In 1907 the prizes were awarded in physics to Prof. Albert A. Michelson of the University of Chicago; in chemistry jointly to Prof. Edouard Buchner of Berlin University, Germany, and to Sir William Crookes of England; in medicine to C. L. A. Laveràn of Paris, France; in literature to Rudyard Kipling of England; and for peace jointly to Ernesto Teodoro Moneta of Italy and Louis Renault of France.

NOBILITY: distinction of rank in civil society which makes a person known above the mass of the people. Society has a tendency to inequality of condition, arising from the natural inequality, physical, moral, and intellectual, of those who compose it, aided by diversity of external advantages, and of principles and habits imbibed at an early age. This inequality is apt to increase; the son, inheriting the faculties or at least the opportunities of his father, is more favorably situated than his father was for making use of them. This rule holds at least in a sufficient number of cases, and for a time; hence, in almost every nation in even the very early stages of civilization something like a hereditary N. appears. Privileges originally acquired by wealth or political power are secured to the family of the possessor of them; and the privileged class come to constitute an order, admission into which requires the consent of society or of the order itself.

The ancient Romans were divided into *nobiles* and *ignobiles*, a distinction corresponding at first to that of patricians and plebeians. A new N. afterward sprang out of the plebeian order, and obtained, B.C. 336, the right to rise to high offices in the state; and in course of time the descendants of those who had filled curule magistracies inherited the *jus imaginum*, or right of having images of their ancestors—a privilege which, like the coat-of-arms in later ages, was considered the criterion of N. The man entitled to have his own image was a *novus homo*, while the *ignobilis* could neither have his ancestor's image nor his own.

The origin of the feudal aristocracy of Europe is in part connected with the accidents which influenced the division of conquered lands among the leaders and warriors of the nations that overthrew the Roman empire. Those who had acquired a large share of territorial possession, and their posterity to whom it was transmitted, were naturally deemed the fittest persons to occupy the great offices of state and wield political power. The Frankish kingdom in Gaul was divided into governments, each under the authority of a chieftain called a count or *comes*—a designation derived from the *comes* of the Roman empire—whose Teutonic equivalent was *graf*. A higher dignity and more extensive jurisdiction was conferred on the *dux*, or duke, a term also of Roman origin, and implying the duty of *leading* the armies of the country. In the Lombard kingdom of Italy, the same term was applied to the great officers intrusted with the military and civil administration of cities and their surrounding provinces. The marquises were guardians of the frontier marches. In the subinfeudations of the greater N. originated a secondary sort of N., under the name of vavasours, castellans, and lesser barons; and a third order below them comprised vassals, whose tenure, by the military obligation known in England as knight's service, admitted them within the ranks of the aristocracy. In France, the allegiance of the lesser no-

ble to mere intermediary lord long continued a reality, in England, on the other hand, William the Conqueror obliged not only his barons who held in chief of the crown, but their vassals also, to take an oath of fealty to himself; and his successors altogether abolished subinfeudation.

The military tenant who held but a portion of a knight's fee, participated in all the privileges of N., and an impassable barrier existed between his order and the common people. Over continental Europe in general, the nobles, greater and less, were accustomed, after the 11th c., to assume a territorial name from their castles or the principal town or village on their demesne: hence the prefix 'de,' or its German equivalent 'von,' still considered over a great part of the continent as the criterion of N. or gentility. Britain was, to a great extent, an exception to this rule, many of the most distinguished family names of the aristocracy not having a territorial origin: see NAME.

Under the feeble successors of Charlemagne, the dukes, marquises, and counts of the empire encroached more and more on the royal authority; and in time, many of them openly asserted independence and sovereignty, with little more than a nominal reservation of superiority to the king. By the end of the 9th c., the Carlovingian empire had been parcelled into separate and independent principalities, under the dominion of powerful nobles, against whom, in Germany, the crown never recovered its power. In France, however, the royal authority gradually revived under the Capetian race, the great fiefs of the higher N. being one by one absorbed by the crown. In England, where the subjection of the feudal aristocracy to the crown always was, and continued, a reality, the resistance of the nobles to the royal encroachments was the means of rearing the great fabric of constitutional liberty. All those who, after the Conquest, held *in capite* from William belonged to the N. Such of them as held by barony (the highest form of tenure) are enumerated in *Domesday*. Their dignity was territorial, not personal, having no existence apart from baronial possession. The *comes* was a baron of superior dignity and greater estates: and these were in England the only names of dignity till the time of Henry III. The rest of the landholders, who held by other tenures than barony, also belonged to the N. or gentry.

After the introduction of heraldry, and its reduction to a system, the possession of a coat-of-arms was a recognized distinction between the noble and the plebeian. In the words of Sir James Lawrence (*Nobility of the British Gentry*): 'Any individual who distinguishes himself may be said to ennoble himself. A prince judging an individual worthy of notice gave him patent letters of N. In these letters were blazoned the arms that were to distinguish his shield. By this shield he was to be known *or nobilis*. A plebeian had no blazonry on his shield, because he was *ignobilis*, or not worthy of notice. Hence

arms are the criterion of N. Every nobleman must have a shield of arms. Whoever has a shield of arms is a nobleman. In every country of Europe without exception, a grant of arms, or letters of N., is conferred on all the descendants.' On the continent, the term noble is still generally used in this sense; in England, it is now more common to restrict the words noble and nobility to the five ranks of the peerage constituting the greater N., and to the head of the family, to whom alone the title belongs. Gentility, in its more strict sense, corresponds to the N. of Sir J. Lawrence and of continental countries. This difference of usage is a frequent source of misapprehension on both sides of the Channel; at some of the minor German courts, the untitled member of an English family of ancient and distinguished blood and lineage has sometimes been postponed to a recently created baron or 'Herr von,' who has received that title, and the gentility accompanying it, only with his commission in the army. It has been taken for granted that the latter belongs to the 'Adel' or N., and that the former does not.

The original higher N. of Germany consisted of the dynasty nobles, i.e., the electoral and princely houses of the realm, with those counts and barons who had a seat in the diet or estates of the realm. These last have, since 1815, all been elevated to higher titles; most of the counts, in recompense for their acquiescence in the abolition of the German empire, receiving the diploma of prince, a title to which English dukes, marquises, and earls have also an undoubted right. The lower German nobility, corresponding to English gentry, were the merely titular counts and barons (i.e., those who had no seat in the diet), the Edelherren and Bannerherren (something like English Bannerets), the Knights of the Holy Roman Empire, the 'Edlen von' (who now take the style of baron), and the common nobles distinguished only by the prefix 'von.' Throughout the middle ages, the lesser N. of Britain preserved a position above that of most continental countries, being, unlike the corresponding class in Germany, allowed to intermarry with the high N., and even with the blood-royal of their country.

The higher N., or N. in the exclusive sense, of England, consist of the five temporal ranks of the peerage —duke, marquis, earl, viscount, and baron (in the restricted signification of the word), who are members of the upper house of parliament. Formerly, all the barons or tenants-in-chief of the sovereign were bound to attend his councils; but after the reign of Edward I., only a select number of them were summoned; the rest appeared by representatives—the former were considered the greater, the latter the lesser barons: see MINOR BARONS. In Scotland, all barons continued to sit in parliament till a much later period; and after the minor barons attended only by representatives from their body, these representatives sat in the same house with the greater N., and, until the union, their votes were recorded as those of the

'small barrounis.' By the act of union between England and Scotland, the Scotch peers elect 16 of their number to represent their body in the house of lords in each parliament. The peers of Ireland, in virtue of the Irish act of union, elect 28 of their number to sit in the house of lords for life. The act of union with Scotland has been understood to debar the sovereign from creating any new Scotch peerages; all peers created in either England or Scotland between that date and the union with Ireland are peers of Great Britain; and peers created in any of the three kingdoms subsequently to the union with Ireland are peers of the United Kingdom, with this exception, that one new peerage of Ireland may be created on the extinction of three existing peerages. When the Irish peers are reduced to 100, then, on the extinction of one peerage, another may be created. All peers of Great Britain or of the United Kingdom have a seat in the house of lords. A Scotch peer, though not one of the 16 representative peers, is debarred from sitting in the house of commons, a disability which does not attach to Irish peers. The peerage of the United Kingdom is, from time to time, recruited by new additions, the persons selected being in general peers of Scotland or Ireland; younger members of the families of peers; persons distinguished for naval, military, political, or diplomatic services; eminent lawyers promoted to high judicial appointments; persons of large property and ancient family, noble in the more extended sense; and occasionally, though rarely, persons who have by commerce acquired large fortunes and social importance. At present, the peerage comprehends about 575 individuals—the number of peerage titles being much greater, as several titles often merge in one person. Five royal dukes are included in this enumeration, also 87 peers of Scotland, and 183 of Ireland. Only 25 of the present Scotch, and 89 Irish, peers are without seats in the house of lords, in consequence of there being, besides the representative peers, 40 peers of Scotland, and 80 of Ireland, who are at the same time peers either of England, Great Britain, or of the United Kingdom. For the privileges belonging to peers as members of parliament, see PARLIAMENT; as peers, they possess also the following immunities: they can be tried only by their peers for felony, treason, or misprision of treason, when all the members of the peerage are summoned, and the accused is acquitted or condemned by the voice of the majority, given not on oath, but 'on honor.' This privilege, which extends to peeresses, either in their own right or by marriage, is in Scotland further regulated by Act 6 Geo. IV. c. 66. A peer answers to bills in chancery on his honor, and not on oath; but when examined as a witness in civil or criminal cases, or in parliament, he must be sworn. He cannot be bound over to keep the peace elsewhere than in the court of queen's bench or of chancery. Scandal against a peer is '*scandalum magnatum*,' a more heinous offense than slander against another per-

son, and subjects the offender by various English acts to statutory punishments. All privileges belonging to the English peers, except the right of sitting in the house of lords, were extended to the peers of Scotland by the treaty of union. A peer who has different titles in the peerage takes in ordinary parlance his highest title, one of the inferior titles being given by courtesy to his eldest son. Certain Courtesy Titles (q.v.) belong also to the daughters and younger sons of a peer, but do not extend to their children.

In France, a limited body of the higher N., styled the peers, were in the enjoyment of privileges not possessed by the rest. The title of duke was subject to strict rule, but many titles of marquis and count, believed to be pure assumptions, were recognized by the courtesy of society. The head of a noble family often assumed at his own hand the title of marquis; and if an estate was purchased which had belonged to a titled family, the purchaser was in the habit of transferring to himself the honors possessed by his predecessor—a practice to which Louis XV. put a stop. Immediately before the Revolution, 80,000 families claimed N., many of them of obscure station, and less than 3,000 of ancient lineage. Nobles and clergy together possessed two-thirds of the land. Practically, the estimation in which a member of the French N. was held depended not so much on the degree of his title as on its antiquity, and the distinction of those who had borne it. The higher titles of N. were not borne by all members of a family; each son assumed a title from one of the family estates—a custom productive of confusion. Unlike 'roturier' lands, which divided among all the children equally, noble fiefs went to the eldest son. The Revolution overthrew all distinction of ranks. 1790, June 18, the national assembly decreed that hereditary N. was an institution incompatible with a free state, and that titles, arms, and liveries should be abolished. Two years later, the records of the N. were burned. A new N. was created by Emperor Napoleon I. 1808, with titles descending to the eldest son. The old N. was revived at the Restoration. All French marquises and viscounts are of pre-revolution titles, none having been created in later times.

Commercial pursuits have more or less in different countries been considered incompatible with N. In England, this was less the case than in France and Germany, where for long a gentleman could not engage in any trade without losing his rank. A sort of commercial 'Bürger-Adel,' or half-gentleman class, was constituted out of the patrician families of some of the great German cities, particularly Augsburg, Nürnberg, and Frankfurt, on whom the emperors bestowed coats-of-arms. In semi-feudal Italy, there was on the whole less antagonism between N. and trade than n. of the Alps. The aristocracy of Venice had its origin in commerce; and though untitled, they were among the most distinguished class of nobles in Europe. On the other hand, in Flor-

ence, in the 14th c., under a constitution purely mercantile, N. became a disqualification from holding any office of the state. In order to the enjoyment of civil right, the nobleman had to be struck off the rolls of N.; and an unpopular plebeian was sometimes ennobled, in order to disfranchise him. A little later, there grew up, side by side with the old N., a race of plebeian nobles—as the Ricci, the Medici—whose pretensions were derived originally from wealth, and who came to be regarded eventually as aristocrats by the democratic party.

Italian N. has this peculiarity, that it does not, for the most part, flow from the sovereign, but from the municipal authorities of the towns, acting in entire independence of him. The municipalities can confer N. on whom they please, by inscribing his name in their respective *Libri d'oro*. The registers of N. of most of the Tuscan towns are deposited in the *Archivio della Nobiltà*, or Heralds' Office, at Florence—an institution created by the first sovereign of the House of Lorraine. The municipalities have, however, no power to confer titles, though at one time several persons, a few Englishmen included, on the strength of their names being in the Libro d'oro of Fiesole, assumed the titles of marquis, count, and baron—an abuse stopped by the late grand duke of Tuscany. In Rome, there is a small number of nobles—as the Colonnas, Caetanis, and Orsinis—who hold their fiefs as sovereign princes; the rest of the N., many of them of very ancient lineage, are municipal, the power of creation being vested in the senator, himself a nominee of the pontiff, and the *Conservatori*, chosen by lot from the Capitoline nobles. In the 18th c., so many undistinguished persons had been added to the roll of N., that Pope Benedict XIV. found it necessary to prohibit by a bull the admission of any one whose ancestors had not filled certain high offices in the state. The same decree limited the number of noble families to 187, designated the *Patriziato Romano*, out of whom 60 of the oldest and most illustrious were chosen as *Nobili Conscritti*, otherwise called the Capitoline nobles, and restricted the admission to the patriziato for the future to persons who had rendered important services to the city, and whose names were approved by the *Congregazione araldica*, an exception being made in favor of members of the reigning pontiff's family. As the families of the conscritti became extinct, other patrician families, designated *Nobili Ascritti*, were added by the municipality to make up the number. The titles at present borne by the Roman N. are: 1. Prince or duke, generally so called, but officially designed 'Barone Romano'—a title acquired by the Borghesi, Rospigliosi, and others ,from popes of their respective families; in the case of the Colonnas, Dorias, Odescalchi, etc., from royal or imperial erection; and in other instances—e.g., the Caetani and Massimi—from investiture by the pope as a temporal sovereign. 2. Marquis and count; many of these are provincial nobles, with titles derived gener-

ally from small feudal tenures, of which, in some instances, it would be difficult to show the diploma, or point out the period of creation. In some parts of the papal states it is understood that every head of a noble house is a marquis; and in the March of Ancona, Sixtus V. conferred the right to bear the title of count on all who were of noble blood at the period. 3. Knights (*Cavalieri*), a designation given to all who wear a Roman order, to Knights of Malta, and generally to younger sons of the titled N. 4. Princes, who, with the sanction of the pope, have purchased honors together with ancient fiefs that carried with them ducal or princely titles, most of them *novi homines*, as the Torlonias. Titles do not descend to the younger members of the family; it is the general usage for the head of the house to bear the most ancient title, while the eldest son, on his marriage, assumes the second in antiquity. The title is sometimes the family name, sometimes the name of a feudal possession. The proper designation of the younger branches of titled families is 'dei Principi,' 'dei Duchi,' 'dei Marchesi,' etc.

The N. of Spain boasts of special antiquity and purity of blood, a descent from warriors and conquerors alone, without the infusion of any of the elements derived from the church, law, and commerce that are found in other countries. 'Hidalgo' (*hijo d'algo*, son of somebody, not *filius nullius*) is a term which implies gentility or N. The hidalgo alone has in strictness a right to the title 'Don,' which, like 'Sir' of English knights and baronets, requires the adjunct of the Christian name. When the Christian name is omitted, the title 'Señor' instead is prefixed with the addition of 'de.' 'Don' has latterly been used by persons who have no proper claim to it, about as extensively as 'Esquire' has been used in England. Hidalguia, till recently, conferred important privileges and immunities. The higher N. are styled Grandees; formerly, the title was 'rico-hombre,' and the ceremonial of creation consisted in granting the right of assuming the pennon and caldron (*peñon y caldera*)—the one the rallying ensign of command, the other of maintenance of followers. In distinction from the grandees, the class of N. below them are called 'los Titulados de Castilla.' Red blood is said to flow in the veins of the hidalgo, blue in that of the grandee. Formerly, there were three classes of grandees, whose mark of distinction was this—that a grandee of the first class was entitled to put on his hat in the royal presence before the king spoke to him; the second, after the king spoke to him; the third, after the king had spoken and he had replied. The second and third classes are now absorbed into the first. Of the grandees, some bear the title duke, some marquis, some count; but it is the ambition of every grandee to unite in himself as many grandeeships, or have as many *hats*, as the phrase is, as he can. This is effected by the marriage of heiresses through whom *grandezza* descends.

and whose names and titles are assumed by their husbands. An enormous accumulation of titles is sometimes found in the person of one grandee. Titles as well as estates go only to heirs of entail. The titulars of Castile are designed 'vuestra señoria;' in common parlance, 'ucia.' The title of Baron is little used in Spain. Physically and mentally, the grandees have degenerated from their ancestors, and they have not the influence at court and in the country which landed property might be expected to give them. Most of them reside at Madrid, clinging to their nominal rank and real nullity, while practically excluded from all functions of state.

In Russia, what N. existed before Peter the Great was patriarchal, not feudal; but in his anxiety to assimilate everything to a western standard, the czar took the existing aristocracies of states quite differently situated as the model to which to approximate the fortunate of his own subjects. The Russian nobles have ever since been enlarging their privileges by encroachments on those under them. Before Moscow was burned, the mass of the nobles connected with the court lived there in great splendor, and with their domestic serfs constituted half the population of that city.

The preservation of noble blood, untainted by plebeian intermixture, has often been reckoned a matter of much moment. In Spain most of all, this purity of lineage has been jealously guarded. In the German empire, no succession was allowed to feus holding immediately of the emperor, unless both parents belonged to the higher N. In France, the offspring of a gentleman by a plebeian mother was noble in a question of inheritance or exemption from tribute, but could not be received into any order of chivalry. Letters of N. were sometimes granted to reinstate persons in this position. It is in Germany still important for many purposes to possess eight or sixteen quarterings, i.e., to be able to show purity of blood for four or five generations, the father and mother, the two grandmothers, the four great-grandmothers; and also, in case of the sixteen quarterings, the eight great-great-grandmothers, having all been entitled to coat-armor. Among the higher grades of the peerage in England, a considerable number may be pointed out who do not possess this complete N. It is in Scotland more usual and more regarded, both among peers and among untitled gentry, where the eight or sixteen quarterings are still in use to be displayed on the funeral escutcheon. At some of the minor German courts, the sixteen quarterings were frequently an illusion, diplomas being granted in the absence of a full pedigree, to declare the parties as noble as if they had sixteen ancestors.

NOBLE, a. *nō'll* [F. *noble*, noble, illustrious, a nobleman—from L. *nōbĭlem*, famous, of high birth: It. *nobile*: L. *nobilĭtas*, high birth, the nobles: *noble* is cognate to *knowable*—L. *nobilis* being a form of anc. *gnobilis*, from root of *gnosco, novi*, know]: high in excellence or worth:

eminent; great; illustrious; exalted; sublime: distinguished by rank and title; of the best kind, as a metal: N. a person of rank above a commoner; an old gold coin, value 6*s.* 8*d.* sterling. NOBILITY, n. *nō-bĭl'ĭ-tĭ*, the highest classes of society (those who are *known*); titled persons and their near relatives; the peerage; noble birth (see above): dignity; grandeur; commanding excellence. NOBLY, ad. *nō'blĭ*, with greatness of soul; heroically. NO'BLENESS, n. *-bl-nĕs*, the quality of being noble; elevation or dignity of mind or station; grandeur. NOBLEMAN, n. *-bl-măn*, a peer; a titled gentleman. NOBLESSE, n. *nō-blĕs'*, or NOBLESS, n. *nō'blĕs* [F.]: persons of noble rank colectively; the nobility. NOBLE METALS, the name given to those metals which can be separated from oxygen by heat alone—viz., gold, silver, platinum, rhodium, iridium, osmium, and mercury.—SYN. of 'noble, a.': honorable; worthy; elevated; generous; liberal; free; ingenuous; heroic; magnanimous; grand; splendid; majestic; imposing; magnificent; stately; superb; august; dignified; renowned.

NOBLE, ANNETTE LUCILE: American author: b. Albion, N. Y., 1844, July 12. She was graduated from Phipps Union Seminary in 1863, and has since devoted herself to literature and traveling. She has published: *Uncle Jack's Executors* (1880); *After the Failure* (1887); *The Crazy Angel* (1901); etc.

NOBLE, EDMUND: English author and journalist: b. Glasgow, Scotland, 1853, Jan. 8. He was educated in Lancashire, and entered journalism in 1872 as reporter on the St. Helen's *Newspaper and Advertiser*. In 1882 he became proprietor of the Liverpool *City News*, and was in Russia as correspondent of the London *Daily News*, and other London journals, in 1882-4. He was a foreign editorial writer of the New York *Herald* in 1887, and edited the American edition of *Free Russia* 1892-4. He has published: *The Russian Revolt* (1885); *Russia and the Russians* (1900); *Before the Dawn* (1901).

NOBLE, JOHN WILLOCK, A.B., LL.B., LL.D.: American lawyer: b. Lancaster, Ohio, 1831, Oct. 26. He was graduated from Yale University in 1851 and engaged in law practice. He was city attorney of Keokuk, Iowa, at the outbreak of the Civil War, when he enlisted and served through the war, rising to the rank of brevet brigadier-general. In 1867-70 he was United States attorney for Missouri at Saint Louis, and in 1889-93 secretary of the interior in President Harrison's cabinet. He has resumed his law practice in Saint Louis.

NOBLESVILLE, *nō'b'lz-vĭl'*, Ind., city, county-seat of Hamilton County, on the White River, and on the Lake Erie & W. and the Chicago & S. E. R.R.'s; about 18 miles north by east of Indianapolis. It was settled in 1824, and in 1839 was incorporated. It is in an agricultural region and in a natural gas belt. Its chief manufactures are flour, foundry products, and strawboard. It has

grain elevators, enameling and carbon works. There is considerable trade in the manufactured articles and farm products. The charter of 1890 provides for a mayor, who holds office four years, and a council. Pop. (1900) 4,700.

NOBODY, n. *nō'bŏd-ĭ* [*no*, and *body*]: no one; no person; a person of no importance.

NOBUNAGA, *nō-bô-nâ'gâ:* Japanese general and statesman: b. Owari 1533; d. Kioto 1582. He was son of a soldier and small landholder, and to the little property left him in 1549 by his father rapidly added more, so that in 1559 he had control of the entire province of Owari. Thence, with the assistance of his lieutenant, Hideyoshi, he made bold forays into neighboring provinces. In 1567 he made an alliance with Yoshiaki, younger brother of the lately assassinated shogun, and, having put him upon the throne in 1568, was appointed vice-shogun, in which office he put down all opposition, crushed the political power of Buddhism, and encouraged the Jesuit missions, no doubt merely to countervail the influence of the Buddhists. Yoshiaki, attempting an alliance against Nobunaga, was deposed in 1573, and Nobunaga took the powers but not the titles of the shogunate, thus forwarding the work of political reform. In 1582 one of his lieutenants, angered, says legend, by a practical joke of Nobunaga, turned against him, hemmed him in a temple in Kioto, and set fire to the building. Nobunaga committed hari-kari. Consult: Dening, *Life of Hideyoshi* (1890); Brinkley, *Japan* (1901).

NOCENT, a. *nō'sĕnt* [L. *nocens* or *nocen'tem*, injuring, hurting—from *nocĕō*, I hurt]: in OE., hurtful; mischievous; guilty.

NOCK, n. *nŏk:* OE. spelling for NOTCH, which see.

NOCTES AMBROSIANÆ, *nŏk'tēz ăm-brō-sĭ-ā'nē* [L., *Ambrosial Nights*]: a collection of papers from *Blackwood's Magazine*, 71 in number, 1822-35. An unedited collection was published Philadelphia, 1843. In 1852, R. Shelton Mackenzie, D.C.L., became a resident in the United States, and copiously edited a new edition, including some papers anticipatory of the N. A., entitled *Christopher in the Tent*, and prefixing to the several vols. portraits and biographies of the writers John Wilson (q.v.), 'Christopher North,' William Maginn, J. G. Lockhart (q.v.), and James Hogg (q.v.), 'the Ettrick Shepherd,' who, with 'others,' were the authors of the articles. William Maginn (1793-1842) was born in Cork, entered Dublin Univ. when 14 years old, received the degree LL.D. when 23, established *Fraser's Magazine*, and was a rare scholar and wit. In 1856, Prof. Ferrier, son-in-law of John Wilson, edited the *Noctes*, giving only 39 out of the 71 numbers. The articles deal with everything in nature, history, society, letters, politics: are mostly in dialogue form, contain both original and quoted

poetry, are full of incisive criticism and remark, and abound with wit—at times of a rollicking sort—the scene being the festive table of a private club, and the *ambrosianæ* referring to the drink of the Olympian gods.

NOCTILIONIDÆ, *nŏk-tĭl-ĭ-ōn'ĭ-dē:* family of bats, of genus *Noctilio*. They are found in tropical regions, are insectivorous, have ears of moderate size, and have no nasal appendages. The stomach is in the form of a sac with the ends turning toward each other, the molars are large and ridged, and in the middle finger there are two phalanges. In some species the tail extends beyond the membrane by which the hind legs are connected, and the hind feet are provided with strong claws. The body is seldom more than five inches long, but the wings spread to the extent of about 18 inches.

NOCTILU'CA, a luminous flagellate protozoan (*Noctiluca miliaris*), abundant throughout all seas, and one of the causes of the 'phosphorescence' of the waves. It is a spherical animal and moves by means of a long stout lash or flagellum, beside which there is a second, very much smaller, lying in the 'mouth' region. Its substance is remarkably spongy, and the phosphorescence is said to have its seat just underneath the tough rind.

NOCTILUCOUS, a. *nŏk'tĭ-lū'kŭs* [L. *nox* or *noctem*, night; *lucĕō*, I shine]: shining in the night or in the dark. Noc'tilu'ca, n. *-kă*, an old name for phosphorus; a phosphorescent marine animalcule. Noctilu'cine, *-sĭn:* substance supposed to impart the quality of phosphorescence to fish, insects, and matter in a state of decay. It is composed of nitrogen and water, and when dried takes the form of a film. It can be dissolved and decomposed by nitric or sulphuric acid, is partially soluble in water, but is insoluble in alcohol or ether. It absorbs oxygen when moist, and as a result of oxidation becomes luminous and gives off carbon dioxide. In medium temperatures it is of the consistence of syrup, and nearly white. The luminous centipede, *Scolopendra electrica*, is said to secrete it in a pure form.

NOCTIVAGANT, a. *nŏk-tĭv'ă-gănt* [L. *nox* or *noctem*, night; *vagor*, I wander about]: wandering by night. Noctiv'aga'tion, n. *-gā'shŭn*, a roving in the night.

NOCTOGRAPH, n. *nŏk'tō-grăf* [L. *nox* or *noctem*, night; G. *graphō*, I write]: a writing-frame for the blind.

NOCTUARY, n. *nŏk'tū-ĕr-ĭ* [L. *noctu*, by night]: an account of what occurs by night.

NOCTULE, *nŏk'tūl* (*Vespertilio noctula*): largest British species of Bat (q.v.), being three inches long without the tail, which is fully an inch and a half. The ears are oval-triangular, shorter than the head; the muzzle is short and blunt. The N. is seen on the wing during only a short part of the year, retiring early in autumn to hollow trees, caves, or under eaves of buildings, where many are sometimes found together.

NOCTURN, n. *nŏk′tėrn* [F. *nocturne*, nocturnal, also a *nocturn*—from mid. L. *nocturna*, a nocturn—from L. *nocturnus*, belonging to the night—from *nox*, night]: in the *Rom. Cath. Chh.*, a religious service at night, or rather at midnight; one of the portions into which the Book of Psalms was divided by the anc. Fathers; a night piece. The service of *Matins* on Sundays and festivals is divided into three nocturns, each of which consists of three (or more) Psalms and three *lessons:* the lessons are from the Scriptures, from the life of a saint, or from a homily of some Father. NOCTURNAL, a. *nŏk-tėr′năl*, nightly; done or happening by night: N. an instrument for taking observations by night. NOCTUR′NALLY, ad. *-lĭ*. *Note.*—In the early Christian Chh., *nocturns* was a service at midnight, and *lauds* an early morning service. Both were subsequently conjoined and called *Matins:* see MATINS, under MATIN: CANONICAL HOURS, under CANON: also BREVIARY.

NOD, n. *nŏd* [Bav. *notteln*, to move to and fro: Icel. *hnioda*, to hammer: Dut. *knodse*, a cudgel]: a movement as if striking with the head; a slight, quick inclination of the head as in token of recognition; a quick movement forward or sidewise of the head in drowsiness or sleep, while in a sitting or upright posture; a command: V. to signify by a slight and quick bending of the head; to be drowsy; to make a slight bow; to beckon with a nod. NOD′DING, imp.: ADJ. inclining the head with a short quick motion; in *bot.*, having the summit so much curved that the apex is directed perpendicularly downward. NOD′DED, pp. NOD′DER, n. *-dėr*, one who nods. NOD′DINGLY, ad. *-lĭ*.

NODAL, NODATED: see under NODE.

NODDLE, n. *nŏd′dl* [Icel. *hnod*, the round head of a nail: Dut. *knod*, a knob: Dan. *knude*, a knot, a protuberance: L. *nodus;* It. *nodo*, a knot]: *properly*, the projecting part at the back of the head; the nape of the neck; then, in jest or contempt, the head itself.

NODDY, n. *nŏd′dĭ* [It. *noddo;* Norm. F. *nauden*, a silly-pate]: simpleton; fool: a kind of sea-fowl supposed to be especially stupid.—*Noddy* (*Megalopterus* or *Anöus*) is a genus of birds of family *Laridæ*, differing from terns in having the bill slightly angular, thus exhibiting an approach to gulls, and the tail not forked but somewhat wedge-shaped. Only one species is known (*M.* or *A. stolidus*), a bird widely diffused in both northern and southern hemispheres, and familiar to sailors, not only as often seen skimming over the water in quest of fishes, but also as frequently alighting on vessels, and, particularly during the night, suffering itself to be taken by the hand. At its breeding-places also, where not accustomed to the visits of man, it scarcely gets out of the way, and the female sits undisturbed on the nest. Hence it commonly shares with the Booby the reputation of unusual stupidity. It is about 15 or 16 inches long from the tip of the bill to the end of the tail, the general

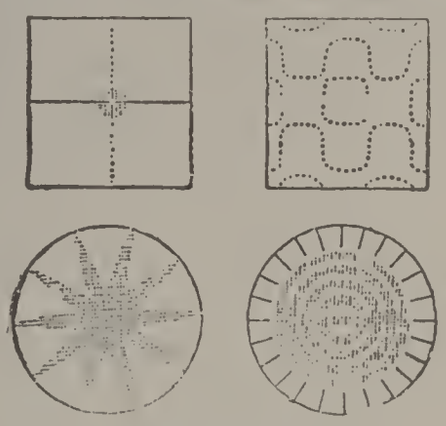
color brownish black. The N. is very abundant in warm latitudes; and on some of the *keys* of the W. Indies, and other islets of different parts of the world, it breeds in immense numbers. Particular islets seem specially selected as breeding-places of noddies; and there their

Noddy (*Megalopterus stolidus*).

nests are sometimes so closely placed that it is not easy to walk among them. Each nest generally contains three eggs, about two inches long, which are very good to eat, and are in some places collected in great numbers.

NODE, n. *nōd* [L. *nodus*, a knot or knob: It. *nodo*—(see KNOT)]: a knot; a knob; a lump; one of the two points where the orbit of a planet intersects the ecliptic (see NODES, in Astronomy): in *bot.*, the part of the stem of a plant out of which the leaves grow (see STEM): the point in which two curves meet: in *poetry*, the plot of a piece: in *music*, one of the fixed points of a sonorous chord (see NODAL): in *surg.*, swelling, usually oblong, on a superficial bone, e.g., the tibia, ulna, clavicle, and frontal bone; due to a syphilitic taint, to scrofula, or to rheumatism. The immediate cause is the infiltration of lymph or serum into the periosteum, or between it and the bone. The treatment depends on the constitution of the patient, and the primary cause of the swelling. NODAL, a. *nō′dăl*, pert. to a node or knot; applied to those points, lines, and sections in a vibrating body which become arrested and remain at rest, while the vibrating parts assume various forms. When a string or metallic cord, under strong tension, is made to vibrate, there are audible, besides the principal sound, several secondary and shriller sounds; these, denominated harmonic sounds, are produced each by a certain portion of the chord which vibrates independently. Further investigation has shown that every vibrating string is divided into a number of portions alternately

vibrating in opposite directions, and that the points which separate these portions from each other are at rest. These points are known as *nodal points*, and their situation may be found by placing small pieces of paper on an extended string, and causing it to vibrate; the points from which the pieces of paper have not been displaced are the nodal points. If a plate of glass or metal be held in the hand, and a well-rosined fiddle-bow be drawn across the edge, particles of fine dust, previously placed on the plate, will arrange themselves in lines, showing that along these lines no vibration has taken place; these lines are *nodal lines*, and are found in



Nodal Points.

most cases to group themselves together into geometrical figures, and occasionally to present beautiful designs (see in the fig.). The arrangement of the nodal lines depends on the point by which the plate is held, and on the form of the plate itself. Similarly, if a column of air in a wholly or partially closed tube be acted on by the force of the breath applied through a hole at any point in its length, the column will divide itself into cylindrical portions each in a state of vibration, and separated from one another by transverse sectional portions in which the air is at rest; these latter sections are known as *nodal sections*. NODATED, a. *nō-dā′tĕd*, knotted. *Note.*—The intervals between *nodes* are called *internodes*.

NODES, *nōdz*, in Astronomy: the two points in which the orbit of a planet intersects the plane of the ecliptic, the one through which the planet passes from the s. to the n. side of the ecliptic being called the *ascending node* ☊, and the other the *descending node* ☋. As all the bodies of the solar system, whether planets or comets, excepting the earth, move in orbits variously inclined to the ecliptic, the orbit of each possesses two N., and a line drawn joining these two points is called the *line of nodes* of each body: the earth, moving in the plane of the ecliptic, has no N. The places of the N. are not fixed points on the plane of the ecliptic, but are in constant fluctuation, sometimes *advancing* (eastward), at other times *receding* (moving westward). This motion is produced by the mutual attractions of the planets, which tend to draw

each of them out of the plane of its orbit; and it depends on the relative position of the planets, with respect to another planet, whether that planet's N. shall advance or recede. On the whole, however, the majority of possible 'relative positions,' or *configurations*, as they are called, is in favor of a retrograde motion; and we find, by observation, that in an average of many revolutions round the the sun a constant retrogradation of the node takes place. The determination of this retrogradation in the case of the planets is a most complicated problem, as the separate action of each on the others has to be taken into account; but in the case of the moon's N., the immensely preponderating attraction of the earth, and its great relative magnitude as compared with the moon, enable us to throw out of account any other disturbing influence, and at the same time to exhibit clearly the cause of this motion of the N. Suppose the moon to have attained her greatest n. latitude, and to be descending toward the ecliptic, and the earth to be in longitude between her and her previous descending node, then the earth's attraction will tend to *depress* the moon's orbit, and cause her to descend to the plane of the ecliptic sooner than she would otherwise have done; in this case we have a retrogradation of the node. Again, supposing the moon placed as before, but the earth in advance of the line of N., then the earth's attraction will tend to draw the moon forward in her orbit so as to meet the ecliptic in a point beyond the previous descending node; in this case, the moon's node has advanced. As in the case of the planets, however, the retrograding tendency preponderates. The average annual retrogradation of the N. is very small in the case of the planets, but considerable in that of the moon: see MOON. In calculating the courses of the planets, the 'length' of the ascending node, or its distance in longitude from the vernal equinox, is a most important element. See ORBIT.

NODIER, *no-de-ā'*, CHARLES E.: French littérateur: abt. 1780–1844, Jan. 27; b. Besançon. His father, a distinguished lawyer, warmly embraced the side of the Revolution, and brought up his son in the same principles. At the age of 12, he was a member of the famous soc. of *Amis de la Constitution*, and hated tyranny with an ideal and classical hatred; but he soon became a royalist; then again, under Napoleon, a republican; and indeed during his whole career showed a lack of that robust opinionativeness without which it is impossible for a man to become a genuine politician. His life was one of hardest literary work, in which time and even admirable talents were wasted on inferior subjects. Besides editions of the French classics, grammatical, lexicographical, and poetical works, he wrote numerous tales and memoirs. A portion of his writings was collected and published, 12 vols., Paris 1832–34, under the incorrect title *Œuvres Complètes*.

NODOSARIA, n. plu. *nō-dō-sā′rĭ-ă* [L. *nodōsus*, knotted —from *nodus*, a knot]: a genus of jointed foraminifera found living or in strata of recent formation.

NODOSE, a. *nō-dōs′* [L. *nodōsus*, full of knots—from *nōdus*, a knot]: knotty; having knots or swollen joints. NODOSITY, n. *nō-dŏs′ĭ-tĭ*, knottiness; a knot in wood formed of concentric layers; in *surg.*, a calcareous secretion found in joints in gout, etc.

NODULE, n. *nŏd′ūl* [L. *nodŭlus*, a little knot—from *nodus*, a knot]: any knot-like body; any irregular concretion of rocky matter collected around some central nucleus, as *nodules* of flint, ironstone, etc. NODULAR, a. *nŏd′ū-lėr*, pertaining to or resembling a nodule. NODULED, a. *nŏd′ūld*, having little knots or lumps. NOD′ULOSE, a. *-lōs*, or NOD′ULOUS, a. *-lŭs*, in *bot.*, applied to roots with thickened knobs at intervals.

NOÉ, *nō-ā′*, AMADÉE DE ('CHAM'): 1819, Jan. 26—1879, Sep. 7: b. Paris; son of the Comte de Noé. He studied painting under Delaroche and Charlet, and showed talent for grotesque work. About 1842 his caricatures, under the signature Cham, began to attract attention; and for nearly 20 years the political and social affairs of the country were delineated by him in a wonderfully ludicrous manner. A large part of his drawings appeared first in *Charivari*, but selections to the extent of several volumes have been published in book form. His later work was given chiefly to vaudevilles.

NOEGERATHIA, n. plu. *nō′gėr-ā′thĭ-ă* [after Dr. *Noegerath*]: in *geol.*, a genus of palm-like leaves found in the Carboniferous and Permian systems.

NOEMATICAL, a. *nō′ĕ-măt′ĭ-kăl* [Gr. *noēma* or *noēm′ătă*, a thought]: in *OE.*, intellectual.

NOE′TIANS: see PATRIPASSIANS.

NOG, n. *nŏg* [Gael. *cnag*, a knock, a thump, a knob; *cnagaidh*, bunchy; *cnagaire*, a knocker, a noggin]: a little pot; a block of wood of the size and shape of a brick inserted into the walls of a building to form a hold for the woodwork; the bolt or treenail which secures the keel of each shore employed in sustaining a ship in dock or on the slip; the piece of wood which scrapes the hopper of a mill.

NOGENT LE ROTROU, *no-zhŏng′ lėh ro-trô′:* town of France, dept. of Eure-et-Loir, in a pretty vale on the Huisne, 32 m. w.s.w. of Chartres. It is a station on the Great Western railway from Paris to Rennes in Brittany; a long, well-built town, with a ruined castle in the Gothic style, residence of the great Sully. Pop. about 7,000.

NOGGIN, n. *nŏ′gĭn* [Gael. *noigean*, a jug or mug with a handle: Ir. *noigin*, a noggin—from Gael. and Ir. *cnag*, a knob, a peg]: a mug or cup.

NOGGING, n. *nŏg′gĭng:* a kind of brickwork carried up between panels, or within the timber framework of a building. NOGGING-PIECES, the horizontal pieces of timber fitting in between the upright timbers or quarters, introduced to strengthen the brickwork.

NOILS, *noylz:* technical term for short and broken hairs removed from wool in the process of combing and preparing it for worsted manufactures. The *noils* are used for making inferior yarns, and for *felting* purposes.

NOISE, n. *noyz* [F. *noise*, strife—from L. *nausĕă*, disgust, annoyance: Prov. *nausa* or *noisa*, noise, dispute, also applied to the murmur of water: Icel. *gnauth*, applied to the clashing of swords, the dashing of ships, and the like]: confused or disagreeable sound of any kind; distinguished technically from tone which originates from *periodic* vibrations whereas noise originates from a periodic vibration; loud, rough talking; occasion of talk; quarrelling; uproar; much public conversation: V. to sound loud; to spread abroad, as a report. NOIS'ING, imp. NOISED, pp. *noyzd*. NOISE'LESS, a. *-lĕs*, silent. NOISE'LESSLY, ad. *-lĭ* (see DEADENING OF NOISE). NOISY, a. *noyz'ĭ*, full of noise; loud; clamorous. NOIS'ILY, ad. *-ĭlĭ*. NOIS'INESS, n. *-ĭ-nĕs*, state of being noisy; loudness of sound. NOISE'LESSNESS, n. *-nĕs*, a state of silence.—SYN. of 'noise n.': cry; outcry; din; clamor; tumult; clatter; stir; sound.

NOISOME, a. *noy'sŭm* [It. *noiare*, to annoy, to molest; *noianza*, annoyance (see ANNOY)]: unwholesome; injurious; offensive to the smell or other senses. NOI'SOMELY, ad. *-lĭ*. NOI'SOMENESS, n. *-nĕs*, quality that disgusts; offensiveness to the smell.—SYN. of 'noisome': noxious; insalubrious; mischievous; destructive; offensive; disgusting; fetid.

NOLA, *nō'lâ:* episcopal city of s. Italy, province of Caserta, 16 m. e.n.e. of Naples; on the site of one of the oldest cities of Campania. The ancient Nola was founded by the Ausonians, and fell into the hands of the Romans in the Samnite war, B.C. 313. For its protection, Marcellus in the second Punic war fought in its vicinity the first battles in which the Romans were victorious over Hannibal. Augustus died at Nola, A.D. 14. The first bells for Christian churches are said to have been cast here in the 5th century. (See BELL.) Numerous coins, and beautiful vases of pale-yellow clay, with figures painted in crimson and maroon, and supposed to have been manufactured here by potters from Corinth, have been found in the vicinity. Nola was a flourishing city in the middle ages. Pop. 7,500; with suburbs, 10,000.

NOLENS VOLENS, *nō'lĕnz vō'lĕnz* [L. unwilling, willing]: in *familiar language*, whether willing or not.

NOLI-ME-TANGERE, n. *nō'lĭ-mĕ-tăn'jĕr-ĕ* [L. *nolo*, I am unwilling; *me*, me; and *tangĕrĕ*, to touch—*lit.*, do not touch me]: a familiar name for several species of plants, one of which is the wild or squirting cucumber; the *Impātĭĕns nolĭ-mĕ-tangĕrĕ*, ord. *Balsamĭnācĕæ*, apparently wild in Britain, and having yellow flowers.—Also, popular name for one form of the disease Lupus (q.v.).

NOLLEKENS, *nŏl'lĕh-kĕnz*, JOSEPH: 1737, Aug. 11—1823, Apr. 23; b. London: sculptor. His father, who was from Antwerp, and by profession a painter, died when Nollekens was young, and his mother, a Frenchwoman, not remaining long a widow, he received little education. Being placed in the studio of Scheemakers, the sculptor, in Vine street, Piccadilly, he worked assidnously, and to such effect that, 1759, the Soc. of Arts awarded him 15 guineas for a group in clay; 1760, 30 guineas for a bas-relief, and 10 guineas for a model in clay of a dancing faun. Soon after this, Nollekens set out for Rome. He was in his 23d year; he had no patron to support him, and his purse was light, but his heart also was light, and he had been trained to habits of economy. A bas-relief that he carved in stone brought him 10 guineas from England, and the Soc. of Arts voted him 50 guineas for his group in marble of Timoclea before Alexander. But one of the most important events for him, after settling in Rome, was his meeting, in the Vatican, Garrick, who immediately recognized his countryman as the young sculptor to whom the prizes had been awarded by the Soc. of Arts, sat to him for his bust, and paid him handsomely for it. This was the first bust he had been commissioned to model, and it gave him the opportunity of proving where his strength lay. He executed in Rome a bust of Sterne in terra cotta, also, which added greatly to his reputation. After ten years in Rome, he returned to London; took a lease of extensive premises in Mortimer street, where he set up his studio; immediately had full employment, and (1771) was elected an associate of the Acad., and a royal academician the following year. His forte was in modelling busts: to these he gave much truth and character, e.g., busts of Samuel Johnson, his friend and frequent visitor, of Fox, Pitt, and other political characters, and of George III., with whom Nollekens was a great favorite for his blunt and manly English manner. Besides busts, Nollekens executed numerous commissions for public monuments and statues. His statue of Pitt for Cambridge was much praised at the time. He executed also a number of classical and mythological statues and groups, a faun, a Bacchus, five Venuses, Cupid and Psyche, Pætus and Arria, etc. In his later years his habitual frugality became almost miserliness: he died in London, leaving mostly to friends (he had no children) his estate equal to about a million dollars. Nollekens's execution was faithful and his workmanship delicate; but he lacks vigor and originality. See Cunningham's *Lives of British Artists*, etc.

NOLLE PROSEQUI, *nŏl'lē prŏs'ĕ-kwī* [L. to be unwilling to proceed]: in *law*, an acknowledgment or agreement on the part of the plaintiff in a civil suit, or of the prosecutor in a criminal suit, that he will abandon it or a part of it: it is an entry on the records of a court. Nolle prosequi may be entered in a criminal case at any

time before the impanelling of the jury; but not afterward unless with defendant's consent. It is not an acquittal, but merely a stay of proceedings. In some states the prosecuting officer may enter a nolle prosequi; in others leave must be had from the court.

NOMAD, or NOMADE, n. *nŏm'ăd* [Gr. *nomadĕs*, wandering or pastoral tribes—from *nomos*, a pasture: It. and F. *nomade*]: one leading a wandering life; one of a tribe which, depending chiefly on flocks and herds, has no fixed habitation, but moves about from place to place for convenience of pasture. The nomad tribes are of a higher grade of civilization than those that live by hunting and fishing, but much inferior to those engaged in agriculture and manufactures. They are generally addicted to robbery, and readily engage in aggressive war, so that they have frequently become conquerors of extensive cultivated countries, as in the instances of the Huns, Arabs and Tartars. There are now few nomads in Europe, and these only in the steppes near the Black Sea, and the regions of the utmost north, where cultivation is impossible. Almost all the Finnish, Mongolian, and Turkish tribes, and the tribes formed by mixture of these races, in the steppes and deserts of central and n. Asia, are nomads, also the Kurds and the Bedouins, many of the tribes of Africa, and the Gauchos and some other Indian tribes in N. and S. America. NOMADIC, a. *nō-măd'ĭk*, leading a wandering life; pastoral; rude; uncivilized. NOMADISM, n. *nŏm'ă-dĭzm*, state of being a nomad. NOM'ADIZE, v. *-dīz*, to live as a nomad. NOM'ADIZING, imp. NOM'ADIZED, pp. *-dīzd*.

NOMANCY, n. *nō'măn-sĭ* [L. *nomen*, a name: Gr. *manteia*, divination]: the act or practice of divining the destinies of persons by the letters which form their names.

NO MAN'S LAND, a name applied to outlying districts in various countries; at one time to what is now mainly Griqualand East; also to a territory of 80,000 square miles in South Australia; to a small island near Martha's Vineyard, Mass.; to a strip of land bordering on Pennsylvania, Delaware, and Maryland, still in dispute between those States because of the displacement of the early boundary stones. Most commonly, however, the name is applied to Oklahoma in the following connection: In 1845 Texas, on being admitted into the Union, ceded to the United States that strip of her land which lay north of lat. 36° 30′ N. This piece, 167 miles by 35, was without government until 1890, when it became a part of Oklahoma. At one time there was a great rush of prospectors and settlers to this section.

NO'MARCHY, or NOME, the largest political division of Greece; a subdivision of a nomarchy is an eparchy, and a subdivision of an eparchy is a demarchy. There are 26 nomarchies in Greece. The government appoints the nomarch who rules or governs a nomarchy. The time

which he holds office is indefinite, but the members of the council, who assist him, are elected by the people for a certain definite time.

NOMBLES, n. pl. *nŭm'blz* [F. *nomblcs* (see NUMBLES)]: the entrails of a deer.

NOMBRE DE DIOS, *nōm'brā dā dēos:* Mexico, city in the state of Durango; about 150 miles from the Gulf of California, and 30 miles southeast of Durango, the nearest railroad station. It is situated in a region noted for its extensive deposit of silver ore. Pop. 10,826.

NOM'BRIL POINT, in Heraldry. See ESCUTCHEON.

NOME, n. *nōm* [Gr. *nŏmē*, division or partition of an inheritance—from *nemcin*, to deal out, to assign a portion of land as pasture]: a tract of country; a province or other political division of a country, especially ancient Egypt and modern Greece. See NOMARCHY.

NOME, *nōm:* term in ancient Greek music to denote any melody determined by inviolable rules.

NOME, *nōm:* Alaska, city in the western part; on the north shore of Norton Sound (q.v.) at the mouth of Snake River; 14 miles west of Cape Nome. It is the commercial centre of an extensive gold mining district in the western part of the Territory, including a large part if not all of Seward Peninsula, as the gold mining district which contributes to the wealth of Nome increases in extent as new fields are prospected. The placer gold fields, so dependent upon water for their development, are not continuous; rich deposits may have long intervening stretches where as yet no gold has been found. Nome came into existence as a mining camp in 1898-9 when gold was discovered in the creeks and streams of the vicinity, and the value of the beach deposits was recognized. Angelo Heilprin, president of the Philadelphia Geographical Society, is authority for the statement that out of the Nome sands in 'barely more than two months' has been taken over $1,000,000 by the crude method of 'rocking.' Nome is the shipping point for Council City, second in size to Nome. The tin found in the vicinity of Cape Prince of Wales, and at Cape York, 90 miles northwest of Nome, is of industrial interest to Nome. Short narrow gauge railroads connect several of the mining camps with the city. The gold output for 1901 was about $7,000,000. The harbor is closed by ice the greater part of the year, so that the city is active only from June to October. The city government is well organized, with all the departments essential for proper maintenance and operation. The streets are lighted by electricity; it has a good water system, free mail delivery, and many of the modern conveniences found in cities in older settlements of the United States. The population in summer is much larger than in winter. (1910) 2,600. See ALASKA.

NOME, CAPE. See CAPE NOME.

NOMENCLATOR, n. *nō'mĕn-klā'tėr* [L. *nomenclātor*, one who calls a person or thing by name— from *nomen*, a name; *calo*, I call]: a person who gives names to things. NOMENCLATURE, n. *nō'mĕn-klā'tūr* [L. *nomenclatūrā*, the names by which things are called]: the words, terms, or language employed in any science or art: a vocabulary of terms. NO'MENCLA'TURAL, a. *-klā'tūr-ăl*, pertaining to a nomenclature. CHEMICAL NOMENCLATURE: see CHEMISTRY.

NOMIAL, a. *nō'mĭ-ăl* [L. *nomen*, a name]: a single name or term in algebra.

NOMINAL, a. *nŏm'ĭ-năl* [F. *nominal*—from L. *nomĭnālis*, nominal—from *nomen*, a name: It. *nominale*]: existing in name only; consisting in names. NOM'INALLY, ad. *-lĭ*, with regard to a name; by name: titularly. NOM'INALISM, n. *-ĭzm*, the philosophical doctrine that general terms exist only in the mind, being simply ideas or mere words—the doctrine opposed to realism. NOM'INALIST, n. *-ĭst*, one who holds the doctrines of nominalism. NOM'INALISTS, n. plu. a sect that applied the doctrine of nominalism to religion, prominent in which was Roscelin in France, 1040-1120. See NOMINALISM.

NOM'INALISM: in the great philosophical dispute of the middle ages, the doctrine that general or abstract ideas have no separate entity and are without real existence. It was contended by one party that abstractions—e.g., a circle in the abstract, beauty, right—had a real existence apart from round things, beautiful objects, right actions: this theory was called Realism. Those that held the opposite view were called Nominalists, because they maintained that there is nothing general but *names;* the name 'circle' is applied to everything that is round, and is a general name: but no independent fact or property exists corresponding to the name. There is nothing in a general name, they say, but a declaration of resemblance among a number of things: all things that the name is applied to resemble one another in some point, which point of resemblance the mind can consider apart from the points of difference; this act of isolated consideration being what is called the power of abstraction. We can be engaged in thinking of the smell of a rose, we can compare it with other sweet odors, and speculate as to the nature of the material that gives the odor, or as to the pleasure that we derive from it; all this is a process of abstract thinking, but it would not of itself suffice to prove that the odor has a separate existence. We might also confine our attention to the mere form or outline of the rose, and compare it with other forms; but we should be still less able to affirm the independent existence of this particular form.

Realism must be traced back to Plato's system of Ideas, or the eternal and independent existence of general attributes, from which (he taught) the concrete embodiments were derived. There existed in the Divine Mind, according to Plato, patterns, models, or arche-

types, according to which individuals were formed. Thus the archetype circle was the original of all actual round things. Aristotle denied the separate existence of these general forms, and held that they existed only in connection with matter, or with objects in the concrete. The Stoics repudiated universals in both senses. The Aristotelian view constituted the Scholastic Realism, and prevailed until the 11th c., when a reaction took place in favor of the Stoical doctrine, headed by Roscelin of Compiègne and John the Sophist. This was the commencement of Nominalism. The celebrated Abelard was a disciple of Roscelin, and induced large numbers to depart from the Realistic notions, which were identified at the time with religious orthodoxy. The controversy raged through the 12th c. with a violence which now seems incredible. Kings and nations took sides: it has been said that scarcely a potentate in Europe refrained from ranging himself on one side or the other in this conflict of speculations. Thomas Aquinas and Duns Scotus, in the 13th c., gave their powerful adhesion to Realism. In the 14th c., William Occam, English Franciscan friar, pupil of Scotus, revived the advocacy of Nominalism, which was once more maintained by a number of eminent men, in spite of the hostility of the church, carried to the length of persecution. The controversy subsided at the Reformation, in whose light, as in a new day, men awoke to questions more important than those of scholastic philosophy. The debate, however, in some modified forms, is recurrent, and is traceable in the attitudes of various schools of thinkers at the present day.

A middle view—rather, what was intended for a middle view—between Nominalism and Realism was held by a few persons when the contest was at its height, and has reappeared from time to time; which was, that though general properties have no separate existence in nature, they can be conceived in the mind apart from any concrete embodiment, e.g., we may form an idea of a circle, irrespective of any individual round body: see CONCEPT (CONCEPTUALISM). This view is tacitly implied in many different lines of opinion now held. See GENERALIZATION; IDEA; PERCEPTION.

NOMINATE, v. *nŏm'ĭ-nāt* [L. *nominātus*, called by name—from *nomen*, a name: It. *nominare:* F. *nommer*]: to appoint by name; to propose or designate by naming for an office or appointment; in *OE.*, entitle; set down. NOM'INATING, imp. NOM'INATED, pp. NOM'INATOR, n. *-tẽr*, one who nominates. NOM'INA'TION, a. *-nā'shŭn* [F.—L.]: state of being nominated; the act or power of mentioning by name; power of appointing. NOM'INOR, n. *-nŏr*, one who points out or nominates. NOM'INEE, n. *-ĭ-nē*, one who has been proposed for an office; the person named by another to an office. NOMINATIVE, a. *nŏm'ĭ-nă-tĭv* [F. *nominatif*—from L. *nomĭnātīvus*]: that simply names; that forms the subject, or part of the subject, of

the verb. NOM'INATIVELY, ad. *-lĭ.* NOMINATIVE CASE, in *gram.*, a noun or name in its simple form; the noun or pronoun which generally precedes the verb and forms the subject: see DECLENSION.

NOMOGRAPHY, n. *nō-mŏg'ră-fĭ* [Gr. *nomos*, a law; *graphō*, I write]: a description or treatise on law; the art of inditing laws.

NOMOLOGY, *nō-mŏl'ō-jĭ* [Gr. *nomos*, law, and *logos*, doctrine]: in philosophy, a little used term designating properly those aspects of science which are concerned with the examination and formulation of laws, in distinction from science as descriptive or explanatory. Used also in law to designate jural science in general.

NON, *nŏn:* a common Latin prefix signifying *not*, reversing the sense of the word which it precedes; a hyphen is generally placed between *non* and the word following, sometimes not—as, *non-ability*, want of ability.

NONAGE, n. *nŏn'āj* [L. *non*, not, and Eng. *age*]: minority; legal unmaturity. NON'AGED, a. *-ājd*, not arrived at maturity.

NONAGENARIAN, n. *nŏn'ă-jĕn-ā'rĭ-ăn* [L. *nonagenārĭŭs*, the ninetieth: F. *nonagénaire*, ninety years of age]: one who is ninety years old.

NONAGESIMAL, a. *nŏn'ă-jĕs'ĭ-măl* [L. *nonagesĭmus*, the ninetieth]: denoting the ninetieth degree or highest point of the ecliptic at any instant.

NONAGON, n. *nŏn'ă-gŏn* [L. *nonus*, the ninth; Gr. *gōnĭă*, an angle]: a plane figure having nine sides and nine angles.

NON'APPEARANCE [for each of the following, see NON, and the word itself]: default of appearance: in *law*, term denoting that a party against whom an action or suit has been commenced has not come before the court to defend his right. In many cases, if he does not appear, the suit will go on in his absence, provided he was duly served with the writ of summons or bill. NON'APPOINT'MENT, neglect of appointment. NON'-ARRI'VAL, failure to arrive. NON-ASSUMPSIT [L. he has not taken or received]: in *law*, the usual plea or defense to an action for breach of a contract not by deed; meaning that the defendant denies that he broke the contract, or that there was any contract. NON'-ATTEN'DANCE, a failure to attend. NON'-ATTEN'TION, want of attention. NON'-COMMIS'SIONED, not having a commission (see NON-COMMISSIONED OFFICERS). NON'-COMMIT'TAL, state of not being pledged or committed. NON'-COMMUN'ION, the not having intercourse or fellowship. NON'-COMPLI'ANCE, the not yielding or giving assent. NON'-COMPLY'-

ING, neglecting or refusing to comply. NON COMPOS MENTIS [L. not in possession of mind, not sound of mind]: see INSANITY: LUNACY: ETC. NON'-CONCUR'RENCE, the not agreeing. NON'-CONDUC'TOR, a substance which does not conduct or transmit, or which resists a passage through—applied when speaking of the passage of such bodies as light, heat, sound, electricity, etc., through other bodies. NON'-CONDUC'TING, not transmitting or sending through. NON'-CONDUC'TION, the quality of not being able to conduct or transmit. NON'-CONFORM'IST, n. one who refuses to conform to an established church. NON'-CONFORM'ING, a. not conforming. NON'-CONFORM'ITY, n. the neglect or refusal to unite with an established church in its forms of worship (see NON-CONFORMISTS, below). NON'-CONTA'GIOUS, not catching or communicating by contact. NON'-CONTA'GIOUSNESS, the quality of not being communicable from a diseased to a healthy body. NON'-CONTENT', not satisfied; a nay or dissenting vote in the house of lords. NON'-CONTRIB'UTING, not paying or imparting a portion or share. NON'-DELIV'ERY, not giving over. NON'-DEVEL'OPMENT, the not discovering of something secret; the not increasing. NON'-DISCOV'ERY, want of discovery. NON'-EFFEC'TIVES, men not fit or available for duty in the army, etc. (see NON-EFFECTIVE, below). NON'-ELAS'TIC, not capable of yielding or bending under pressure without fracturing or breaking; that cannot be bent. NON'-ELECT', one not chosen or elected. NON'-ELEC'TION, the failure of election. NON'-ELEC'TRIC, that conducts the electric fluid; also NON'-ELEC'TRICAL. NON'-EN'TRY, the failure to make a required or proper entry: in *Scottish law*, the condition of a feudal estate when the last vassal has died, and his successor has not been invested or seized of the land. NON'-EPIS'COPAL, not vested in or governed by bishops. NON'-ESSEN'TIAL, not necessary or requisite. NON'-EXECU'TION, failure of due performance. NON'-EXIS'TENCE, a thing that has no existence; the negation of being. NON'-EXIS'TENT, not having existence. NON'-FEAS'ANCE, in *law*, not doing what one is bound to do. NON'-FULFIL'MENT, the not performing or completing. NON'-JOIN'DER, in *law*, omitting to join all the parties to an action or suit. NON'-METAL'LIC, destitute of the properties of a metal. NON'-NAT'URAL, unnatural; denoting an abnormal state of body or function. NON'-OBE'DIENCE, failure in required or expected obedience. NON'-OBSER'VANCE, neglect or failure to observe. NON'-PAY'MENT, a neglect in payment. NON'-PERFORM'ANCE, the not doing a promised thing. NON'-PRODUC'TION, the neglect or failure of exhibiting to view, or of producing. NON'-PROFES'SIONAL, unskilled; not belonging to the profession. NON'-PROFI'CIENT, an unskilled person; one who has failed to improve. NON'-PROFI'CIENCY, failure to make progress. NON'-RES'IDENT, a. not residing in a particular place, or in one's proper place: N. one not residing on his own estate, as a gentleman, or in his own official place, as a

clergyman (see NON-RESIDENCE). NON'-RES'IDENCE, state or condition of being a non-resident (see this title below). NON'-RESIST'ANCE, passive obedience; submission to power or authority, however arbitrary, on religious grounds. NON'-RESIST'ANT, n. one who maintains that no resistance should be made to constituted authority, however oppressive the acts of such may be: ADJ. making no resistance to the undue or unjust exercise of power or authority. NON'-RESIST'ING, offering no obstruction. NON'-SEN'SITIVE, wanting sense or perception. NON'-SEX'UAL, having no distinction of sex; neuter. NON'-SLAVE'HOLDING, not possessing slaves. NON'-SOL'VENT, not able to pay debts; insolvent. NON'-SOL'VENCY, inability to pay debts. NON'-SUBMIS'SIVE, unyielding; not compliant. NON'-SUBMIS'SION, want of submission. NON'SUIT (see below).

NONCE, n. *nŏns* [a corruption of the OE. phrase, *to than anes*, for that only]: present purpose or occasion; used only in the phrase, *for the nonce*.

NONCHALANCE, n. *nŏng'shă-lŏngs'* [F. *nonchalance*—from *non*, not, and *chaloir*, to matter—from L. *calere*, to be hot]: coolness; indifference; carelessness. NONCHALANT, a. *nŏng'shă-lŏng'*, cool; careless; indifferent.

NON-COMMIS'SIONED OF'FICERS, in the Army: officers without a commission, receiving certificate from some subordinate authority; and ranking below sub-lieut.; they comprise corporals, sergeants, etc.; and constitute a numerous and very important class in the regimental system, between the commissioned officers and the men. As the former are not permitted to mix with the private soldiers, lest familiarity should diminish the sway of absolute discipline, it is necessary to have an intermediate class to supervise the men in their barracks and at all times when off the parade. None are so suited for this duty as the best conducted of the men themselves, who are promoted by selection to non-commissioned rank, and hold many privileges and powers unattainable by the privates. The non-commissioned officers can be reduced to the ranks by sentence of a court-martial, or by their col.-commandant; but not by a lieut.col. nor by any junior officer. Accustomed themselves to obey, they are admirable assistants in preserving discipline; veterans, to whom military life is a second nature, they are looked up to by their comrades as examples, to lead in battle or to teach in drill. This rank is a necessity in all armies; in France, the non-commissioned officers are termed *sous-officiers;* in Germany, *unter-offizieren*.

NONCONFORM'ISTS, in England: name sometimes given generally to all sectaries who, at any period in English history since the establishment of Protestantism, have refused to conform to the doctrine and practices of the Episc. Church as established by law. It is, however, more frequently used in a restricted sense to denote the 2,000 clergymen who 1662—two years after the Restoration—left the Church of England, rather than submit to the conditions of the Act of Uniformity, which required of every beneficed minister, every fellow of a college, and even every schoolmaster, unfeigned assent to all and everything contained in the Book of Common Prayer. The ejected ministers swelled the ranks of the Congregationalists (then called Independents) and the Presbyterians; and the term N. in Eng. usage is sometimes almost specifically applied to Congregationalists. See PURITANS: DISSENTERS.

NONDESCRIPT, n. *nŏn'dĕ-skrĭpt* [L. *non*, not; *descriptus*, described]: a person or thing that cannot easily be described—used disparagingly; an oddity; anything not yet described or classed: ADJ. undescribed.

NONE, a. n. *nŭn* [AS. *nan*, not, no—from *ne*, not; *an*, one]: not any; not one.

NON-EFFEC'TIVE: term applied to the portion of the personnel of the army or navy not on active service or in immediate readiness for active service. It thus comprises all officers on retired or half-pay, pensioners, and superannuated officers. In a force liable to frequent augmentations and reductions, the non-effective charge must be considerable, and a large retirement is necessary, in order to rapid promotion. The great French war, also, with the reductions following it, bequeathed to the British an annual non-effective charge of several millions of pounds, not yet wholly expunged. 1883–4, the non-effective charges were £2,916,800 for the army, and £2,071,400 for the navy—a large percentage on the gross cost of the two services. The U. S. milit. and naval force is kept so small in numbers that the non-effective element is comparatively unimportant.

NON-EGO, n. *nŏn-ē'gō* [L. *non*, not; *ego*, I]: see under EGO.

NONENTITY, n. *nŏn-ĕn'tĭ-tĭ* [L. *non*, not; *ens* or *entem*, being]: a thing not existing; the negation of a being; a person of no weight or importance.

NONES, n. plu. *nōnz* [L. *nonæ*, the nones—from *nonus*, the ninth]: in the *calendar of anc. Rome*, the seventh day of each of the months March, May, July, and Oct., and the fifth day of Jan., Feb., April, June, Aug., Sep., Nov., and Dec.; the *nones* occur nine days from the *ides*, reckoning inclusively.

NONES, n. plu. *nōnz* [see NONES 1]: the fifth of the canonical hours in the offices of the Rom. Cath. Breviary devotions, at about 3 P.M.—or about the 9th hour, counting from 6 A.M.; devotions for the ninth hour: see CANONICAL HOURS: CALENDS.

NON EST INVENTUS, *nŏn ĕst ĭn-vĕn′tŭs:* [L., he has not been found]: technical phrase in law, denoting that when, after judgment, the sheriff endeavors to arrest a party, he is unable to find the debtor after reasonable search. The sheriff's return to the court is called a return of *non est inventus.*

NONESUCH, n. *nŭn′sŭch* [*none*, and *such*]: anything which has no equal, as a fruit or plant; name of an apple.

NONILLION, n. *nŏn-ĭl′yŭn* [L. *nonus*, the ninth, and Eng. *million*]: a number produced by raising a million to the ninth power; in *Eng. notation*, 1 followed by 54 ciphers; in the *French* and *Italian*, one thousand raised to the 10th power, or 1 followed by 30 ciphers.

NON-INTRUSIONIST, n. *nŏn′-ĭn-trô′zhŭn-ĭst* [L. *non*, not; and Eng. *intrusionist*]: in *Scotch eccles. hist.*, one who was opposed to a presentee being intruded or forced into the cure of a parish against the will of the people.

NONIONINA, n. *nŏn′ĭ-ō-nī′nă* [L. *nonus*, ninth, as occurring in *nines*]: a genus of many-celled organisms occurring as fossils in the Chalk and Tertiary strata, and now living in existing seas.

NONIUS, n. *nō′nĭ-ŭs:* a name frequently given to the contrivance for subdividing the scales of graduated instruments, from the supposed inventor *Nonius;* a Frenchman, Vernier, was the real inventor, and the contrivance is generally called the *vernier.*

NON-JUROR, n. *nŏn-jô′rĕr* [L. *non*, not; *juror*, I swear, I take an oath]: a person who refused to take the oath of allegiance to the sovereigns who filled the throne of Great Britain after the revolution, conceiving that James II. had been wrongly deposed, and his descendants unjustly excluded from the throne—applied first to that portion of the Episc. clergy of England who at the coronation of William and Mary refused to take the oath of allegiance to these sovereigns. They were great champions of the doctrine of passive obedience on the part of subjects toward kings; and as the triumph of the Prince of Orange was obtained at the expense of that doctrine, it was impossible that they could, consistently with their antecedents, acknowledge him as their rightful king. The house of commons allowed them six months longer than laymen to make up their minds, but declined to adopt the amendment of the lords, viz., that the oath should not be imposed on the clergy. They refused, and were consequently deprived of their sees and benefices. The non-jurors comprised Abp. Sancroft, 8 bishops, and about 400 of the inferior clergy. NON-JU′RING, a. not swearing allegiance.

NONPAREIL, a. *nŏn′pă-rĕl* [F. *nonpareil*, matchless—from L. *non*, not; F. *pareil*, like—from mid. L. *paric′ulus*, dim. from L. *par*, equal]: unequalled; matchless: N. that which is matchless: a variety of apple: a size of printing-type, next larger than *agate*, next smaller than *minion* (see TYPE, in Printing).

NONPLUS, n. *nŏn′plŭs* [L. *non*, not; *plus*, more]: a condition or state of things in which one can do *no more*, or is unable to proceed; an insuperable difficulty: V. to put or bring to a stand; to perplex completely; to puzzle. NON′PLUSING, or NON′PLUSSING, imp. NON′PLUSED, or NON′PLUSSED, pp. *-plŭst.*

NON-RES′IDENCE: in church law, the offense of a person holding a Spiritual Benefice who absents himself without legal justification from the local precincts within which the duties attached to the benefice are prescribed to be preformed. The obligation of residence follows clearly from every principle of law; and from the constant tendency to relaxation on the part of the clergy, it has been a subject of repeated legislation, ecclesiastical and civil, from the very earliest times. The Council of Nice 325, of Antioch 332, and of Carthage 401; the constitutions of the popes from the earliest genuine document of that class, the novels of Justinian, the capitularies of Charlemagne—all speak the same language, and enforce it by the same penalties. During the mediæval period, and especially during the unhappy contests of the western schism, great abuses prevailed. The whole substance of the legislation of the Roman Church on the subject, however, is compressed in the decrees of the Council of Trent, which are mainly contained in the decrees of the XXII. and following sessions, 'On Reformation.' The decrees of the council regard all church dignitaries, and others charged with the cure of souls; and for all, the penalty of absence without just cause, and due permission, consists in forfeiture of revenues, in a proportion partly varying with the nature of the benefice, partly adjusted according to the duration of the absence. For each class, moreover, a certain time is fixed, beyond which, during 12 months, absence cannot be permitted. The duty is imposed on persons named in the law of reporting to the ecclesiastical superiors cases of prolonged absence.

NONSENSE, n. *nŏn′sĕns* [L. *non*, not, and Eng. *sense*]: that which is not sense; unmeaning words or language; words which convey no intelligent ideas; absurdity. NONSEN′SICAL, a. *-sĭ-kăl*, unmeaning; foolish. NONSEN′SICALLY, ad. *-lĭ.* NONSEN′SICALNESS, n. *-nĕs*, absurdity.

NON SEQUITUR, *nŏn sĕk′wĭ-tėr* [L. *non*, not; *sequĭtur*, it follows]: in *logic*, a term applied to an inference which does not follow from the premises.

NONSUCH: see NONESUCH.

NONSUIT, n. *nŏn′sūt* [L. *non*, not, and Eng. *suit*]: in *law*, an abandonment of a suit when actually in court, by the plaintiff, on the discovery of some error or defect, but which does not prevent his beginning his suit again on payment of the costs: V. to enter the abandonment of his suit, by a plaintiff or pursuer, on the record of a court. NON′SUITING, imp. NON′SUITED, pp. adjudged to have abandoned the suit, as the plaintiff.

NONSUIT: a legal term, meaning an adjudication that on the facts presented by a plaintiff in an action he cannot recover; it decides only the particular action; it does not decide the right of the parties except as to the precise facts presented at the time the nonsuit is ordered. It is not a final adjudication and so it is not a bar to a subsequent action, unless the nonsuit is ordered on the merits of the case. There are two kinds of nonsuits, voluntary and compulsory. If the plaintiff at any time before the case has been finally submitted to the jury, finds that through some accident or defect he will not be able to present facts sufficient to win his case, he may at his request be nonsuited, except in cases where the defendant interposes a counter claim, in which case it rests in the discretion of the court to permit the plaintiff to be nonsuited or not. When the plaintiff has closed his case and it is apparent that he cannot recover, the court will order a compulsory nonsuit on the request of the defendant. This will be done whenever it is clear that a verdict in favor of the plaintiff would be set aside by the court as contrary to the evidence. When a plaintiff is nonsuited he must pay the defendant's costs; and if the nonsuit is compulsory, he can either appeal or may commence the action anew, and try to present sufficient evidence to sustain a recovery. When a nonsuit is ordered by the court, the case is taken out of the hands of the jury.

NONTRONITE, n. *nŏn'trō-nīt:* a hydrated tersilicate of iron, found in small kidney-shaped masses, varying in color from green to yellow—so called because found in *Nontron,* in France.

NOODLE, n. *nô'dl* [a probable corruption of NODDLE, which see]: an expressive word for a simpleton.

NOOK, n. *nûk* [Scot. *neuk;* Gael. *niuc,* a nook: Fin. *nokka,* the beak of a bird; *nokkia,* to peck: Esthon. *nukka,* a tip, a corner]: a corner; a small recess.

NOOLOGY, *nō-ŏl'ō-ji* [Fr. *nous,* reason, and *logos,* doctrine]: a little-used term in philosophy attributed to Hamilton, meaning that portion of philosophy which deals with intuitive, as distinct from demonstrative, truth.

NOON, n. *nôn* [from L. *nona,* for *nona hora,* the *ninth hour* among the anc. Romans, equal to our three o'clock in the afternoon: It. *nona,* the fifth of the seven canonical hours, the service of which was shifted from *mid-afternoon* to *midday:* Icel. *non,* the third meal or resting-time of the day]: midday; 12 o'clock; middle of the day; height of the day: ADJ. happening at noon; meridional. NOONDAY, or NOONTIDE, a. *nôn'tīd,* pertaining to noon or midday: N. the time of noon. HIGH NOON, the exact meridian or midday.

NOOSE, n. *nôz* or *nôs* [prov. F. *nous* or *nouzel*, a knot —from L. *nodus*, a knot: comp. W. *nais*, a band, a tie: Gael. *nasg*, a tie-band, a wooden collar for a cow]: a running-knot binding closer the more it is drawn: V. to catch or tie in a noose; to ensnare. Noos'ing, imp. Noosed, pp. *nôzd*.

NOOSSA. See Moluccas.

NOOT'KA DOG: large kind of dog, common in a domesticated state among the natives of the vicinity of Nootka Sound. It has erect, pointed ears. It is remarkable for the extreme abundance of its long woolly hair, which, when shorn off, holds together as a fleece, and is spun and woven into garments. The introduction of this wool-bearing dog into other countries has been suggested, but not yet attempted.

NOOTKAS, *nôt'kaz*, or Ahts: the family of Indian tribes on Vancouver Island, Canada, and the adjacent mainland. This family includes the Nootkas, or Moonchahts, numbering about 3,500 and living on the w. part of the island; the Quackewlth, of which there are 15 or 20 tribes and about the same number of people as the Nootkas, living on the island and the mainland; and the allied Cowichans in the e. of the island, numbering about 7,000. The principal god of the Nootkas is Quawteaht, whom they regard as their progenitor; they worship also the sun and moon, and a supernatural bird called Tatooch. They are separated into clans. No member of a clan can marry in it, and children belong to the clans represented by their mothers. The posts of their houses are stationary, but the coverings are carried from one place to another as the owners go on their expeditions. They are successful fishermen, and very ingenious in making clothing and various household utensils. The dead are seldom buried, but are placed in boxes, and either hung up in trees or covered with bushes or stones. The Ahts are not friendly to the whites, and cannot safely be trusted. The Cowichans have given some attention to agriculture, and have received missionaries with kindness.

NOOT'KA SOUND: inlet on the w. coast of Vancouver Island, British Columbia, lat. 49° 35′ n., long, 126° 35′ w. Its entrance is protected by an island of the same name, and the Sound can be entered on both sides of the island. It extends inland 10 m. n.n.e.; but the greatest breadth of water is not more than 500 yards. Numerous small coves and inlets are around the rocky shores. It affords good anchorage.

NOPAL, n. *nō'păl* [Mexican, *nopalli;* Sp. *nopal*, the cochineal fig-tree]: a species of cactus or Indian fig on which the cochineal insect breeds; the *Opuntiă cochinillif'ĕra*, ord. *Cactăcĕæ*. Nopallerie, n. *nō'păl'ĕr-ĭ*, the field where cactuses are cultivated on which cochineal insects may be bred.

NOR, conj. *nŏr* [AS. *ne*, not, and *or:* short for *nother*, old spelling of *neither*]: a connecting particle correlative to *neither, not*, expressed or understood; a particle which marks the second or subsequent branch of a negative proposition; poetically used instead of *neither.*

NORD, *nōr:* most northerly dept. in France (whence its name), corresponding with the former province of French Flanders, bordering on Belgium and the Strait of Dover; 2,185 sq. miles. Its form narrows near the middle at Armentières, on the Lys, almost to a line. It is watered by the Scheldt and the Sambre, with their affluents, and by numerous canals. Next to that of the Seine, it is the most densely peopled dept. in France. The soil is fertile, well cultivated, and yields more abundant harvests than any other part of the country: 883,606 acres are arable. The principal products are wheat, hemp, beet-root, vegetables, tobacco, and fruits. Manufactures of lace, cambric, linens, and beet-root sugar are extensive. It has much larger proportion of railways, roads, and canals than any of the other departments, as well as the most important coal and iron mines. No other dept. has so many populous towns and strong fortresses; none adds so much to the national revenue; in none are the people so intelligent, so susceptible of culture, or so industrious. In educational and benevolent institutions, and learned societies, it ranks next to the dept. of the Seine. The arrondissements are Lille, Douai, Cambrai, Valenciennes, Avesnes, Hazebrouck, and Dunkerque. The chief town is Lille.—Pop. of dept. (1901) 1,866,994.

NORDAU, *nôr'dow,* Max Simon, German physician and author: b. Budapest, Hungary, 1849, July 29. He studied at the University of Budapest, receiving his degree in 1872; he then traveled for six years, visiting the principal countries of Europe, and in 1878 began the practice of medicine in Budapest. In 1880 he went to Paris, and after two years of study resumed the practice of his profession there. He began his literary career at Budapest before entering the University as contributor and dramatic critic for *Der Zwischenact;* he subsequently was an editorial writer and correspondent for several other newspapers. His newspaper writings were collected and furnished the material for his earlier books, including *Pariser Studien und Bilder* (1878); *Seifenblasen* (1879); *Vom Kreml zur Alhambra* (1880); *Paris unter der dritten Republik* (1881), which are mostly criticisms of political and social conditions. In 1883 he published *Die konventionellen Lügen der Kulturmenschheit* (English translation, *Conventional Lies of Society*), in which he shows what he believes to be the essential falsity of some of the social, ethical, and religious standards of modern civilization; and in 1892 published *Entartung,* translated into English under the title *Degeneration.* This is his best known work and

provoked much criticism; in it he maintains that the civilization of the present, the new inventions, and the growth of great cities have resulted in the degeneration of man, especially of the higher classes; that this degeneration is seen particularly in the lowered, and often depraved, standard of literature, art, and music; and that the authors and artists of the day whose work is in accordance with these standards, are themselves mental and moral degenerates. His other works include: *Paradoxe* (1885; in English, *Paradoxes*); *Die Krankheit des Jahrhunderts* (1887; in English, *The Malady of the Century*); *Seelen Analysen* (1892); *Die Drohnenschlacht* (1897); *The Drones Must Die* (1899); *Zeitgenössische Franzosen* (1901); *Morganatic* (1904); *Mahâ-Rôg* (1905); the novel, *Gefühlskomödie* (1891; in English, *A Comedy of Sentiment*); and the dramas, *Der Krieg der Millionen* (1832); *Des Recht zu lieben* (1893); *Die Kugel* (1894); and *Dr. Kuhn* (1898). Dr. Nordau is a Jew and has been one of the prominent leaders of the Zionist movement. An attempt to assassinate him was made in the latter part of 1903.

NORDENFELT, *nôr'dĕn-fĕlt*, Torsten Vilhelm, Swedish inventor: b. 1842. He received a thorough technical training; from 1862 to 1866 was engaged in promoting the sale of Swedish iron in London; and early in the eighties established in Sweden, England, and France factories for the production of ammunition, machine guns, torpedoes, and submarine torpedo boats. Soon afterward with Hiram S. Maxim (q.v.) he formed the Maxim-Nordenfelt Company. Oscar II. of Sweden named him royal chamberlain in 1885. Nordenfelt's best known invention is a machine gun, intended as a defense against torpedo boats, made with from 2 to 12 barrels, from any one of which the supply of ammunition can be shut off without interfering with the other barrels. See Guns.

NORDENSKJÖLD, *nawr'dĕn-shöld*, Adolf Eric, Baron: b. Helsingfors, Finland, 1832, Nov. 18. He was educated at the univ. in his native place, and became proficient in his favorite studies; but the Russian authorities suspected him of designs against the govt., and he was compelled to leave Finland, and was not allowed to return for several years. He was prof. of mineralogy in Stockholm 1858, and afterward a member of several Arctic expeditions, some of which he organized. He carefully explored and made a map of Spitzbergen, visited Greenland 1870, became a member of the Swedish diet, in which he served two years, surveyed a part of North-East Land 1873, made various other explorations, and 1878 started on the voyage in which he discovered the North-East Passage, and reached Japan the following year. He was made baron 1880, and received various foreign decorations. In 1883 he led an expedition which went farther toward the interior of Greenland than any previous one had done. He died 1901, Aug. 12.

NORDERNEY, *nawr'dĕr-nĭ:* small island of the Prussian province of Hanover, three m. off the coast of E. Friesland; one of a string of islands that line that coast; about 4 sq. m. Since 1797, it has had great repute as a place for sea-bathing, and has about 2,000 summer visitors. The little village at the w. end of the island has a tastefully-built *Conversations-Haus*, 130 ft. long. Trees do not grow here.—Permanent pop. about 3,800.

NORDHAUSEN, *nawrt'how-zĕn:* flourishing town of Prussian Saxony, pleasantly situated at the s. base of the Harz Mts., on the Zorge, 38 m. n.n.w. of Erfurt. The surrounding country is very fertile in corn, and in the vicinity commences the *Goldene Aue* (Golden Plain), a fertile valley watered by the Helme. It contains a gymnasium, and numerous churches, one, St. Blasius, containing two pictures by Luke Cranach. It carries on a thriving general trade, is the dépôt from which the Harz Mts. are supplied with necessaries, and has most extensive distilleries and considerable manufactures of tobacco, succory, chemicals, cloth, leather, etc. From its great export of pork, ham, sausages, etc., Nordhausen is called sometimes the Cincinnati of Germany. Its spirit distilleries, of which there are 60 in almost constant operation, produce annually for export more than 100,000 hogsheads of corn-brandy. Pop. 28,500.

NORDHAUSEN SULPHURIC ACID, *nŏr-hawz'ĕn:* the strongest or fuming sulphuric acid as prepared at Nordhausen in Prussia; concentrated sulphuric acid.

NORDHEIMER, *nawrd'hī-mĕr*, ISAAC, PH.D.: 1809-1842, Nov. 3; b. Memelsdorf, Germany. He was thoroughly educated for a Jewish rabbi, and graduated from the Univ. of Munich, with the degree PH.D., 1834. He came to this country, was prof. of Arabic and other Oriental languages, and acting prof. of Hebrew at the Univ. of New York 1836-1842; and during most of the same period was an instructor in sacred literature in Union Theol. Seminary. He was one of the leading Hebrew scholars of modern times, and a very successful teacher. On the voyage to America he commenced writing a Hebrew grammar, which was published in two vols., passed through several editions, and was pronounced 'the most elaborate and philosophical Hebrew grammar in the English language.' He was a valued contributor to the *Biblical Repository*, published *A Grammatical Analysis of Select Portions of Scripture, or a Chrestomathy*, and left in MS. grammars of the Chaldee and Syriac and the Arabic languages in German; a large Arabic grammar in English; a translation of Ecclesiastes, with explanatory notes, in German; and an unfinished Hebrew concordance. Nordheimer, though in long and friendly association with Christian scholars who highly esteemed his services, retained his Jewish faith.

NORDHOFF, *nawrd'hŏf,* CHARLES: b. Erwitte, Westphalia, Prussia, 1830, Aug. 31—1901, July 15. When five years of age he was brought to this country by his parents, and after attending the public schools in Cincinnati, entered a printing office 1843. The next year he found work in a Philadelphia newspaper office, but soon left it to join the U. S. N., in which he remained three years, afterward sailing in various merchant and fishing vessels. He returned 1853 to newspaper work in Philadelphia, from there went to Indianapolis, and 1857–61 was on the editorial staff of a New York publishing house. He joined the staff of the *Evening Post* 1861, with which paper he remained 10 years. After travelling in California and the Hawaiian Islands, and acting as correspondent of the New York *Tribune,* he became 1874 the Washington correspondent of the New York *Herald.* Among the large number of his publications are *The Merchant Vessel; Nine Years a Sailor; The Freedmen of South Carolina; California for Health, Pleasure, and Residence; Politics for Young Americans; The Communistic Societies of the United States;* and *God and the Future Life.*

NORDICA, *nôr'dĭ-ka,* LILLIAN, American opera singer: b. (LILLIAN NORTON) Farmington, Maine, 1859. She studied in the Boston Conservatory at Milan under Sangiovanni, and made her operatic début at Brescia in 'Traviata.' She was immediately engaged for the Imperial opera at Saint Petersburg, and after two years there, appeared in Paris in 1882. In the same year she retired from the stage to marry Frederick A. Gower, whom she sued for divorce in 1885, but who disappeared at about the time of the suit, probably having been killed in a balloon accident. She first appeared in London in 1887, and in New York in 1895. In 1894 she played Elsa in 'Lohengrin' at the Wagner Theatre in Baireuth, and in 1896 married the Hungarian tenor, Doehme, who took the title role in 'Parsifal' at Baireuth in 1894. She obtained a divorce from him in 1904. Her repertoire is large and she is especially successful in Wagnerian opera and in 'Les Huguenots' as Aïda.

NORDLINGEN, *nört'lĭng-en:* town in w. Bavaria, on the river Eger, 44 m. n.w. of Augsburg by the Munich and Nürnberg railway. It has a Gothic church with a high tower and fine organ; and manufactures of Tyrolese carpets, linens, and woolens, besides a large trade in feathers. N. is historically interesting as the scene of several battles, the most famous of which was fought between 24,000 Swedes, under Count Horn and Duke Bernhard of Saxe-Weimar, and 45,000 imperialists under King Ferdinand. The Swedes were defeated with the loss of 12,000 killed and wounded, 300 banners and standards, 80 cannon, and several thousand prisoners, among whom was Horn himself.—Pop. 8,300, of whom the majority are Protestants.

NORE, *nōr,* THE: sand-bank in the estuary of the river Thames, 4 m. n.e. of Sheerness, on which there is a floating light, the Nore light, lat. 51° 29′ n., long. 0° 48′ w. The name is commonly applied to the portion of the estuary in the vicinity of the N. light and sand-bank.

NORFOLK.

NORFOLK, *nawr'fok:* a large and important eastern maritime county of England, bounded n. and n.e. by the North Sea, s.e. and s. by the county of Suffolk, s.w. by Cambridge, w. by Lincoln; greatest length e. and w. 67 m., greatest breadth 42 m.; 2,119 sq. m., or 1,356,173 acres. Its coast-line, from Yarmouth to the mouth of the Nen in the Wash, is about 100 m. in length. From Yarmouth to Happisburgh, the coast is low and sandy; from Happisburgh to Weybourne, it is skirted by low cliffs; and w. of Weybourne to the entrance to the Wash, where the banks are in great part dry at low-water, and where a considerable extent of land has been reclaimed from the sea (see WASH), it is low, and covered with sand or shingle. The surface of the county is level, or nearly so. The principal rivers are the Ouse, the Yare, with its affluents the Wensum and the Waveney, and the Bure. Communication is supplied by the navigable rivers, and by the Great Eastern railway. The climate is affected by cold n.e. winds, in spring particularly; but the air is in general dry and healthful. The soil consists chiefly of light sands and loams, and comprises much land not naturally fertile, but made so by judicious management. The agriculture of the county is in an advanced condition, and all the usual crops are extensively grown; that of barley is especially celebrated. On half the acreage food is raised for cattle, and thus the necessary manure is supplied. Geese and turkeys are extensively reared for the London market. The county is divided into three parts, N., S., and W. Norfolk, each returning two members to the house of commons. Cap. Norwich. Pop. of county (1801) 273,371; (1821) 344,365; (1851) 442,714: (1871) 438,656; (1881) 444,749; (1891) 318,310; (1901) 318,438.

NORFOLK, *nawr'fok:* town in Litchfield co., Conn.; in the n.w. part of the state, 45 m. w.n.w. from Hartford, on the Connecticut Western railroad. It borders on Berkshire co., Mass.; and is in a hilly region famed for healthfulness of air, purity of water, and beauty of natural scenery. N. has in recent years become a summer resort. It has a savings-bank, good schools, and the Robbins Academy, collegiate preparatory. A complete and beautiful library building, erected by private munificence, is for free public use, as is also a complete and costly gymnasium. The village green is adorned with an artistically wrought fountain. The town of N. includes the several villages of N., North, South, and West N. It has a silk mill, and a manufactory of excellent underwear; but farming and dairying are the principal interests. Pop. (1890) 1,546; (1900) 1,614; (1910) 1,541.

NORFOLK.

NOR'FOLK: independent city and port of entry of Va.; on the Elizabeth river, lat. 36° 51′ n., long. 76° 19′ w.; 17 m. by land, 33 m. by water, from the Atlantic Ocean, 8 m. above Hampton Roads, 88 m. s.e. of Richmond. Seven railroads furnish inland communication with all points, and there are regular lines of steamers to New York, Boston and Providence, Philadelphia, Baltimore, and Richmond. The city is also a point of landing for the Allan steamships from Liverpool, a large business is done with coastwise and river boats, and considerable freight is brought through the Dismal Swamp and the Albemarle and Chesapeake canals. Across the river, about one mile to the s.w., and connected with N. by a steam ferry, is the city of Portsmouth (pop. 14,000). The two places are so intimately associated in business interests as to be virtually one city, and they form the leading U. S. naval station. Manufactures have increased since 1901 and the city has extensive commerce. It ranks third in the Union in cotton receipts, and second in exports of cotton to Great Britain. Annually more than 500,000 bales are received, and over half of the quantity is exported. Small fruits, sweet potatoes, and garden vegetables are shipped in larger quantities to northern markets than from any other port. This is also the leading point of shipment for peanuts, about 1,500,000 bushels being distributed from here each year. The city is built on level ground, with wide but somewhat irregular streets, is lighted with gas, has a good supply of water, and a well equipped fire department. There are many churches, several academies and public schools, a Rom. Cath. theol. seminary; daily, weekly, and monthly papers; national, state, and private banks, savings banks, and trust company. A chamber of commerce and a cotton exchange are maintained by the two cities of N. and Portsmouth in conjunction. Among public buildings are the custom-house, court-house, city hall, Masonic temple, and a military academy. The harbor is large and safe, and is defended by Fort Calhoun and Fortress Monroe (q.v.); the latter is considered the strongest defensive work in the country. At the navy-yard, near by, there are two dry docks; the larger, completed 1889, holds 8,000,000 gallons of water, and cost nearly $500,000.—The first settlement at N. was made 1705. St. Paul's Church, still standing, was built 1739 of brick brought from Holland. A cannon ball fired during the bombardment of the city by the British 1776 still remains in one of the walls, but the communion service was seized and taken to England. Nearly every other building in the place was destroyed. A city charter was obtained 1845. The exports from N., including Portsmouth, average annually over $10,310,000. Pop. (1900) 46,624; (1910) 67,452.

NOR'FOLK, DUKE OF: see HOWARD, HOUSE OF.

NOR'FOLK ISLAND: in the Pacific Ocean, 1,100 m. e.n.e. of Sydney in Australia, lat. 29° 10′ s., long 167° 58′ e.; length, about 6 m.; breadth, 2½ m.; 8,607 acres. It is the largest of a small cluster of islands, comprising N., Nepean, and Philip Islands, with several rocky islets. The coasts are high and steep, so that landing is impossible except at two places, and not very safe there; and the surface generally is uneven, with average of 400 ft. above sea-level, and rising in Mt. Pitt above 1,000 ft. The soil is fertile and well watered, and the climate healthful. In 1825, N. I. was made a penal settlement by the British govt. for the worst class of convicts sent out to New South Wales; but the experiment was a failure, and the establishment was broken up 1855. In a mission school founded by Bp. Patteson 150 Melanesian youth are taught. In 1856 the inhabitants of Pitcairn Island (q.v.)—194 in number, descendants of the mutineers of the *Bounty*—were transferred hither by the British govt. Total pop. 870.

NOR'IC ALPS: see ALPS.

NORICUM, *nŏr'ĭ-kŭm:* one of the provinces of the old Roman empire, lying s. of the Danube, occupying a large part of the area of the modern divisions of Styria, Upper and Lower Austria, Carinthia, and smaller portions of Carniola, Salzburg, and Bavaria. When conquered by the Romans, in the reign of Augustus, its only large town was Noreia, but under its new rules the province increased largely in population and several towns were established.

NORIUM, *nō'rĭ-ŭm:* name assigned by Svanberg to a metal, whose earth (or oxide) is associated with zirconia in certain varieties of the mineral zircon. Its existence is not definitely established.

NORM [L. *norma*, a carpenter's square]: in philosophy, a standard by means of which events, acts or objects may be tested. Truth is the norm in logic. Beauty is the norm in æsthethics, right in ethics, etc. The philosophical sciences just mentioned are sometimes called in their entirety 'normative' in distinction from the natural sciences which are supposed to deal with things not as they ought to be but as they are. This distinction is much less absolute than is ordinarily held. Natural sciences have often normative elements, so far as they tell us what must be done to secure certain ends, and normative philosophical sciences all contain a certain amount of concrete factual material.

NORMAL, a. *nŏr'măl* [F. *normal*—from L. *normālis*—from L. *norma*, a square or rule]: according to established rule or law; ordinary; obeying what is believed to be the natural law; perpendicular; natural form or structure; teaching first rules and principles: thence, instructing in the art of teaching: N. the perpendicular to a curve at some particular point, being also the perpendicular to a tangent. NOR'MALLY, ad. *-lĭ.*

NORMAL SCHOOL.

NORMAL SCHOOL, *nawr'mal:* institution where teachers are instructed in the principles of their profession and trained in the practice of it. The name is of French origin [*École Normale*, from Lat. *norma*, a rule or model], and is generally used in Scotland: such institutions, in England, are oftener called 'Training Colleges;' in Germany 'Seminaries.' In the United States the usual name is N. S. That in acquiring knowledge the mind follows certain processes, and that any one imparting knowledge should work in harmony with these processes, seem obvious truths; yet only recently have they secured much attention; and they are even at this day deliberately denied by some men of thought, and of high educational position, who deny that educational processes are universally the same, or can be certainly known, and who ascribe to the N. S. system the forced development of mechanical methods of teaching. The recognition of the desirableness of these institutions has, however, been sufficiently extensive to secure their establishment in Great Britain, America, France, Germany, and Switzerland; and Italy, and even Russia, are following the example of the countries named. These schools afford also a thorough course of instruction in the subjects taught in elementary schools. The only N. S. for training the highest class of teachers for colleges and academies is in Paris.

One of the earliest, if not the earliest, N. S. in Great Britain was the Sessional School of Edinburgh (1830), afterward developed into the 'General Assembly's Normal Institution.' The first attempt in England was Battersea Training College, instituted by Mr., afterward Sir J. P. K. Shuttleworth, and Mr. Tuffnell. Sir J. P. K. Shuttleworth subsequently, as sec. to the committee of privy council on education, suggested measures which resulted in the institution of about 50 colleges for training of teachers in connection with the Established and Dissenting Churches, in which, after two years' course training, young men and women receive government certificates of merit and become teachers of elementary schools.

Near the beginning of the present century, De Witt Clinton recommended the founding of teachers' seminaries in the state of New York. In 1834 a Saturday normal school was held in New York. In 1835 the Rev. Charles Brooks, of Hingham, Mass., having visited the Prussian schools, began to agitate the subject, and the result was a convention at Hanover, Mass., 1838, Sep. 3, Daniel Webster, John Quincy Adams, and other eminent men taking part in the discussion. The same year, a gift of $10,000 by the Hon. Edmund Dwight led the Mass. board of education to vote three normal schools, of which the first was opened at Lexington, Mass., 1839, with Cyrus Pierce as principal, but afterward removed to Framingham. The second was established the same year at Barre, and the third at Bridgewater—the second removed subsequently to Westfield. The first building

bought for a normal school was at West Newton, Mass., Josiah Quincy giving the $1,500 necessary, at the instance of Horace Mann; the first building erected for the purpose was at Bridgewater, Mass. The state normal school at Albany, N. Y., was opened 1844, Dec., David P. Page, principal. A city normal school was established in Philadelphia, 1848; New Britain, Conn., and Ypsilanti, Mich., 1849; Bristol, R. I., 1852; Salem, Mass., 1853; Iowa City, Io., 1855; Trenton and Beverly, N. J., 1855–56; Indianapolis, and a state institution in Ill., and a school at Charleston, S. C., 1857; at Oswego, N. Y., 1861; at Madison, Wis., and San Francisco, 1862; three in Penn., at Millersville, 1859, Edinboro, 1860, and Mansfield, 1862; at Farmington and Castine, Me., and Emporia, Kan., 1864; Baltimore, Md., 1865; Brockport, N.Y., Platteville, Whitewater, and Oshkosh, Wis., Kutztown, Penn., 1866; Randolph, Johnson, and Castleton, Vt., Peru, Neb., Terre Haute, Ind., Guyandott and West Liberty, W. Va., 1867.—In 1889 there were 135 public and 41 private normal schools, with 23,853 students. There are 32 city schools of this character, and a step higher has been taken in the founding of normal colleges, with a more extensive curriculum. The New York city school has 38 regular teachers, and 27 teachers in its model school. The graduates of the normal schools furnish about 4 per cent. of the whole number of teachers in the United States. 'In comparison with an ideal,' writes Francis W. Parker, 'the normal schools of this country are very crude, necessarily so, for the opposition to them has been long and bitter. The state normal schools are, at the best, good academies, with the addition of some slight theoretical knowledge and practical skill. The great inducement offered to legislators for the founding of state normal schools, was that the children of farmers would have good high school advantages. The city training school is in some respects a marked improvement upon the state normal school. The Boston N. S. is probably the best city training school in America. Applicants for admission into this school, must have had a full four years' course in the high school, and in addition must be specially recommended by the principal of the high school from which the applicant graduates, as a promising candidate for professional training. The old pupil-teacher plan, that grew out of the Lancastrian, or monitorial, system of teaching (see BELL, ANDREW) is now generally rejected as ineffieient.'

NORMAN, a. *nŏr'măn* [F. *Normand;* OF. *Norman;* Icel. *Nordmadr*]: pertaining to Normandy, in France, or to the anc. Normans of Scandinavia: N. a native of Normandy: also, a Norwegian; a Northman.

NORMAN ARCHITECTURE: variety of the Romanesque style, originated and used chiefly by the Normans, and introduced into England by William the Conqueror. Soon after the Norman conquest of n. France, they began to erect churches and cathedrals in memory of their victories. Their conquests supplied them with the means

for making these large edifices. Not content with the small churches then common in France, they desired monuments worthy of their great conquests. They accordingly expanded the dimensions, while to a great extent retaining the style of the buildings that they found in France. They seem also to have borrowed some of their ideas from the Rhine. See GOTHIC ARCHITECTURE.

The leading characteristics of their style were size and massiveness. They adopted the old Latin plan (derived from the Basilica) of a central portion with aisles at the sides; and at the e. end, they invariably placed a semicircular apse. They seized on the tower as a distinguishing feature, and developed it as their style progressed. The ornaments are simple and of great variety; but the most common and distinctive are the zigzag, billet, chevron, nail-head, etc. The windows and doors are simple, with semicircular arched heads—the former without tracery. The tympanum of the door-arch is occasionally filled with sculpture.

The nave arches are carried sometimes on single pillars, but more frequently, especially in later periods, on piers with shafts. The shafts are almost always recessed in nooks (or 'nook-shafts'). Owing to the great size of the buildings, the architects were unable at first to vault the main central portion, which, accordingly, had usually a wooden roof, the aisles only being vaulted.

The masonry is rude; the joints being large, and the stones generally unhewn. The style prevailed from about the beginning of the 10th c. till the death of William the Conqueror, near the end of the 11th c. There are many examples in Normandy, the churches at Caen being well-known buildings of the date of William.

This style of architecture was brought into England by the Normans at the Conquest, 1066. They there extended the scale of the buildings, as they had done in Normandy, preserving, however, many local peculiarities of the Saxon style, which they found in the country. The chapel in the White Tower of the Tower of London is the earliest example of pure Norman work in England. There are, however, many buildings, both in England and in Scotland, which date from before the end of the 12th c., when the pointed style began to be used. Durham, Lindisfarne, Canterbury, Dunfermline, are partially Norman, besides many other churches and castles The Anglo-Norman is heavier than the French-Norman, the cylindrical nave piers of the above-named buildings being much more massive than those of French works. To relieve this heaviness, the chevron, spiral, and other groovings were cut in the piers. The moldings and forms of doors, windows, etc., are the same as those of Normandy. There is one remarkable difference in the plans of the early Norman churches in the two countries: in France, the apse at the e. end is always semicircular; in England, this form was gradually given up; and toward the last, the square e. end was universally adopted.

NORMANDY, *nawr'man-dĭ* (Fr. *Normandie*): formerly a province in n. France, bordering on the English Channel; now divided into the depts. of Seine-Inférieure, Eure, Orne, Calvados, and Manche. It is in general a very fertile, richly cultivated land, resembling a garden in many districts. Its chief agricultural products are corn, flax, and fruits (from which cider is largely made); its fisheries and manufactures of great importance, and its horses the best in the kingdom. The inhabitants mostly are descendants of the old Normans, and bear the stamp of their splendid ancestry. They are strongly built, and of intelligent, noble, and energetic character; warm-hearted and patriotic, they produce the boldest sailors, the most skilful fishermen, agriculturists, cattle-rearers, and gardeners in all France. In the n.e. and more level part (formerly *Upper Normandy*), the principal towns are Rouen, Dieppe, Havre-de-Grace, Harfleur, Honfleur, Lisieux, Evreux, Yvetot; in the s.w. and hilly part (*Lower Normandy*), the principal towns are Caen, Falaise, St.-Lô, Bayeux, Coutances, Avranches, Granville, Alençon, Cherbourg, and Mont-St.-Michel. Rouen, the ecclesiastical metropolis, was always the chief city of the duchy of N.

In the time of the Romans, the country bore the name *Gallia Lugdunensis II.* Under the Frankish monarchs it formed a part of Neustria, and was called N., first, after Charles the Simple, 912, had given it to Rolf or Rollo, leader of a band of Norse rovers (see NORMANS), to be held by him and his posterity as a fief of the French crown. From Rolf (baptized into Christianity under the name Robert) and Gisela, daughter of Charles, sprang the later dukes of N., of whom Richard I., grandson of Rolf, vigorously maintained his authority against his liege lords, Louis IV. and Lothaire. William II., son of Robert II., became Duke of N. 1036; and 1066 established a Norman dynasty on the throne of England (see WILLIAM THE CONQUEROR), thereby politically uniting N. with England. In 1077 his eldest son, Robert, wrested N. from him; but it was again united to England under Henry I. 1105. With this monarch, Rolf's male line became extinct. Henry II., son of Henry I.'s daughter, Matilda, after the death of Stephen of Blois, obtained 1154 the govt. of England and N.; but in the reign of his son, John Lackland, it was conquered by Philippe Auguste (1203–4). It remained a portion of the French monarchy more than 200 years; but after the battle of Agincourt (1415) it was reconquered by the English, who held it till 1449, when it was finally wrested from them by Charles VII. The name N. has long passed out of formal use, except that the abp. of Rouen still keeps the title Primate of N. See Liquet's *Histoire de la Normandie* (1835); Palgrave's *History of N. and of England* (1851–64).

NOR'MANDY, Customary Law of (Fr. *Coutumier de Normandie*): one of the systems of laws according to which principally the ancient provinces of France were governed. These systems were called *Coutumes* (customs): they had originated in local usages, and been in the course of time reduced to writing and formally sanctioned by the sovereign. *Coutume* was distinguished both from *loi*, which originated with the king, and from *us*, or usage not reduced to writing. Of the codes of customary law, one of the oldest and most famous was the *Coutumier de Normandie*. It was divided into the ancient and modern custom. The former was reduced to a written form first in 1229, under St.Louis; the latter was the ancient *coutumier*, modified and reformed 1585 by commissioners appointed by Henry III., with the concurrence of the three estates of the nobility, clergy, and people of Normandy. The ancient *coutumier* treats principally of the duties of judicial officers, proceedings in the different courts, and the rights and obligations of kings of France, dukes of Normandy, feudal lords, and the people. In the modern *coutumier* are minute regulations regarding the transmission of property by will and inheritance. Each of the 22 vicomtés into which N. was divided had a different mode of devising real property. The law by which the Channel Islands are still governed is based on the customary law of Normandy. The chief judge in Jersey, Guernsey, and Alderney retains the Norman name of bailli or bailiff, and his authority is much the same as that officer possessed under the Norman law. One of the most remarkable remnants of the *coutumier* still subsisting in the Channel Islands is the *Clameur de Haro*. Any one who considers that his rights of property are infringed protests in the presence of two witnesses, and, calling out three times 'Haro' (said to be a way of invoking Duke Rollo, noted for his justice), summons the trespasser to desist. He then applies to the authorities, relating what he has done, and proceeds to the record office, where note is taken of the circumstances; all which ceremonial must be gone through before bringing an action of trespass. The decision is generally referred to *une vue de justice*, and the losing party is subjected to a fine and liable in costs: he had formerly also to undergo *un regard de château*, or 24 hours' imprisonment, for having implored the aid of the prince without cause.

NORMANS, *nawr'manz* (i.e., Northmen): name generally limited in its application to those sea rovers who established themselves in that part of France called, after them, Normandy; but sometimes embracing also the early inhabitants of Norway. During the middle ages, the name Northmen, or Norsemen, was often used in a broader sense, to denote the entire population of Scandinavia, and still more frequently, perhaps, to designate the Danes and Norwegians, exclusive of the Swedes. The Germans and French called the piratical hordes who ravaged their shores Normans or Northmen; the Saxons called them usually Danes or Eastmen. They were distinguished also by the latter as *Mark*- or Marchmen (from Den-*mark*), as *Ask*-men (i.e., men of the *ashen*-ships), and as the *Heathen*. The primary cause of the plundering expeditions southward and westward across the seas, undertaken by the Norse Vikings (*Vikingar*, meaning dwellers on the *vics*, i.e., bays or fiords), as they called themselves, under leaders who took the name of 'Sea Kings,' was doubtless the overpopulation and consequent scarcity of food in their native homes; besides, the relish for a life of warlike adventure, conjoined with the hope of rich booty, strongly attracted them; while—at least as long as the old Scandinavian religion lasted (i.e., till about the end of the 10th c.)—death in battle was not a thing to be dreaded, for the slain hero passed into a region in which he was provided with the fierce rapture of eternal strife in the Walhalla of Odin. Finally, discontent with the ever-increasing power of the greater chiefs or kings induced many of the nobles, with their followers, to seek new homes.

The first Danish Norsemen made their appearance on the e. and s. coasts of England 787. After 832, their invasions were repeated almost every year. To one of these belongs the *legend* of Ragnar Lodbrok (i.e., Ragnar of the 'Shaggy Brogues'), who is said to have been taken prisoner by Ella, king of Northumbria, and thrown into a dungeon filled with vipers, where, while expiring amid horrible torments, he sang with heroic exultation the story of his life. The very existence, however, of such a person as Ragnar Lodbrok is questioned by many Scandinavian scholars. In 851, the Norsemen wintered for the first time in the island, and after 866 obtained firm footing there. The Anglo-Saxon Ethelred I. fell in battle against them 871. His brother Alfred, known as Alfred the Great (q.v.), after a long and doubtful struggle, partially reduced them to subjection; nevertheless, he was compelled to leave them in possession of Northumbria and East Anglia; and had not only to defend himself against a new and fierce invasion led by the famous rover Hastings (q.v.), but, like his immediate successors, to contend against the revolts of his Dano-Norman subjects. A period of external peace now ensued; but in 991 the invasions of the Danes and Norwegians began anew. The Saxon king, Ethelred II., at first sought to buy them off by paying a sort of tribute-money, called

Danegelt (q.v.); but the massacre of the Danes living in England, by command of Ethelred, 1002, Nov. 13, was avenged by four expeditions under the Danish king, Swen, who frightfully wasted the country, and finally conquered it 1013, dying the following year. His son Knut, or Canute (q.v.), after carrying on a struggle for the supreme power with Ethelred and his successor, Edmund Ironside (q.v.), at length, on the death of the latter, became sole monarch of England, which now remained under Danish or Norse rulers till 1042. The government of the country then reverted into the Saxon hands of Edward the Confessor (q.v.), who was succeeded 1066 by Harold II. (q.v.), son of the powerful Godwine, Earl of Wessex (q.v.); but in Oct. of the same year, Harold lost his life and crown at the battle of Hastings; and William the Conqueror, descendant of a Norwegian chief who had settled in Normandy, once more established a Norse dynasty on the throne of England, but one greatly refined and improved by long residence in a comparatively civilized region.

Danish Norsemen were they also, in particular, who ravaged the w. coasts of the European mainland, from the Elbe to the Garonne. As early as 810, the Danish king, Gottfried, had overrun Friesland; but the power of Charlemagne was too much for these undisciplined barbarians, and they were overawed and subdued for a time. Soon after his death, however, they recommenced (about 820) their piratical expeditions, and, favored by the weaknesses and dissensions of the Carlovingian rulers, became, during the 9th c., the terror and scourge of n.w. Germany and France. They plundered Hamburg several times, ravaged the coasts of the Frisians (which then extended as far as the Scheldt), and 843 firmly planted themselves at the mouth of the Loire. But ere long they ceased to be satisfied with making descents and settlements on the coasts, and in their small piratical craft they swarmed up the great rivers into the interior of the country, which they devastated far and wide. Thus, 845, they ascended the Seine and plundered Paris—an exploit frequently repeated. In 885 not less than 40,000 of these Vikings are said to have ascended the river from Rouen, under the leadership of one Siegfried, in 700 vessels, and besieged the capital for ten months. It was saved at the expense of Burgundy, which was abandoned to their ravages. In 881, Louis or Ludwig III., king of the West Franks, inflicted a severe defeat on the invaders at Vimeu, near Abbeville in Picardy, the memory of which has been preserved in a song still popular among the country-people; but neither that, nor the repulse which they sustained from the brave German monarch Arnulf, near Louvain, 891, could hinder them from fresh irruptions. In 892 they appeared before Bonn, and tradition says that bands of Danish rovers penetrated even into Switzerland, and established themselves in the canton of Schweiz and the vale of Hasli. From their settlements in Aquitania they

proceeded at an early period to Spain, plundered the coasts of Galicia 844, and subsequently landed in Andalusia, but were defeated near Seville by the Moorish prince Abd-ur-Rahman. During 859-860, they forced their way into the Mediterranean, laid waste the shores of Spain, Africa, and the Balearic Isles, penetrated up the Rhone as far as Valence; then turning their piratical prows in the direction of Italy, entered the Tyrrhene Sea, burned Pisa and Lucca, and actually touched the distant isles of Greece before their passion for destruction was satiated, or before they dreamed of returning west.

Doubtless Norwegian rovers also took part in these so-called Danish expeditions. We know that as early as the beginning of the 9th c. they made voyages to n. Ireland, Scotland, the Hebrides, the Orkney and Shetland Isles; and the increasing power of Harald Haarfager, in the 9th and 10th c., exciting discontent among the smaller chiefs, great emigrations took place, and these islands became the new homes of these Norwegian Vikings. About the same period, colonies were settled in the Faröe Isles and Iceland, from which some Vikings proceeded westward across the north Atlantic to Greenland 982, and thence, 1002, s. to a region which they called *Vinland*, now universally believed to be the coast of New England, thus anticipating by nearly 500 years the discovery of America by Columbus. From Norway also issued the last and most important expedition against the coast of France, led by Rolf or Rollo, who had been banished by Harald Haarfager on account of his piracies. Rolf forced Charles the Simple to grant him possession of all the land in the valley of the Seine, from the Epte and Eure to the sea. By the time of Charles the Bald, the invaders had firmly planted themselves in the country, which then went by the name of Normandy (q.v.). These and their descendants are, strictly speaking, *the Normans* of history—warlike, vigorous, a brilliant race. They rapidly adopted the more civilized form of life that prevailed in the Frankish kingdom—its religion, language, and manners—but inspired everything that they received with their own abundant vitality. At a later period (12th c.), they even developed a great school of narrative poetry, whose cultivators, the *Trouveurs* or *Trouvères*, rivalled in celebrity the lyrical Troubadours of s. France (see TROUVÈRE: FRENCH LANGUAGE AND LITERATURE). Their conquest of England, 1066, gave that country an energetic race of kings and nobles, on the whole well fit to rule a brave, sturdy, but somewhat torpid people like the Anglo-Saxons. But though the Normans had acquired comparatively settled habits in France, the old passion for adventure was still strong in their blood; and in the course of the 11th c., many nobles, with their followers, betook themselves to s. Italy, where the strifes of the native princes, Greeks and Arabs, opened a fine prospect for ambitious designs. In 1059, Robert Guiscard, one of the ten sons of the Norman count, Tancred de

Hauteville, all of whom had gone thither, was recognized by Pope Nicholas II. as Duke of Apulia and Calabria, and in 1071 as lord of all Lower Italy. His brother and liegeman, Roger, conquered Sicily 1060–89. Roger II. of Sicily united the two dominions 1127; but in the person of his grandson, William II., the Norman dynasty became extinct, and the kingdom passed into the hands of the Hohenstauffen family.

The Swedish Norsemen directed their expeditions chiefly against the e. coasts of the Baltic—Courland, Esthonia, and Finland, where they made their appearance in the 9th c.—the very time when their Danish and Norwegian brethren were roving over the North Sea, the English Channel, the Bay of Biscay, and were establishing themselves on the shores of England and France. According to the narrative of the Russian annalist, Nestor, they appear to have penetrated into the interior as far as Novgorod, whence they were quickly banished by the native Slavic and Finnish inhabitants, but were as quickly solicited to return and assume the reins of government. Hither, consequently, 862, accompanied by other noted warriors, came three Swedish chiefs, Rurik, Sineus, and Truwor, sons of the same father, belonging to the tribe of *Ros* (whence *Russ* and *Russians*). Rurik founded one kingdom at Novgorod, which stretched northward as far as the White Sea. His successor, Oleg, united with that a second established by other Swedish adventurers at Kiev, which town now became cap. of the wide-extended Russo-Swedish kingdom: see RUSSIA. For a long period these Norsemen, who, it appears, became completely identified with their Slavic-speaking subjects in the 10th c., were dangerous enemies of the Byzantine empire, whose coasts they reached by way of the Black Sea, and whose capital, Constantinople, they frequently menaced, e.g. 941, when Igor is said to have appeared before the city with more than 1,000 ships or boats. Earlier in the same century, these Swedo-Russian warriors had found their way into the Caspian Sea, and actually penetrated to the coasts of Tartary and Persia. Partly from them, and partly from native Scandinavians, came those soldiers who from the 9th to the 12th c. formed the body-guard of the Byzantine emperors.—See Deppings's *Histoire des Expéditions Maritimes des Normands et de leur Etablissement en France au 10^me^ Siècle* (2 vols. 2d edit. 1843); Wheaton's *History of the Northmen from the Earliest Times to the Conquest of England* (1831); Worsaae's *Minder om de Danske og Normändene i England, Skotland, og Irland* (1851); Freeman's *History of the Norman Conquest* (1867–76).

NORNS, n. plu. *nŏrnz*, or NORNAS, n. *nŏr'năs*, or NORNÆ [Icel. *norn*]: in *Scand. myth.*, the three Fates, the *Parcæ* of the north, three young women, by name Urd, Verdandi, and Skuld, i.e. The Past, The Present, The Future. They sit by the Urdar-well under the world-tree Yggdrasil, and there determine the fate both of gods and of men. Every day they draw water from the spring, and with it and the clay that lies around the wells, sprinkle the ash-tree Yggdrasil, that its branches may not rot and wither away. Besides these three great norns, there are many inferior ones, good and bad; for, says the Prose Edda, when a man is born there is a norn to determine his fate; and the same authority tells us that the unequal destinies of men in the world are attributable to the different dispositions of the norns. These lesser norns corresponded to the *genii* of classic mythology. Women who possessed the power of prediction or magic also bore this name.

NORRISTOWN, *nŏr'is-town:* borough, and cap. of Montgomery co., Penn.; on the e. bank of the Schuylkill river, along which it extends two miles; on the Philadelphia and Reading, the Schuylkill Valley, and the Stony Creek railroads about 16 m. n. w. of Philadelphia, 41 m. from Reading. It is on hilly ground, the most elevated parts 200 ft. above the river. The town is well laid out, and, except in the outskirts, most of the buildings are of brick or stone. The streets are macadamized, there are two lines of street railroad, gas and electricity are used for lighting, and an abundant supply of water is obtained from the Schuylkill and distributed from an immense reservoir 194 ft. above the level of the river. There are many fine churches, good schools and a seminary, well equipped libraries, opera houses; and daily and weekly papers, one of the latter being devoted to law, and one printed in German. There is an active board of trade, telegraph and telephone facilities, national banks, trust and safe deposit companies, several building and loan associations, and a large number of beneficial societies. The court-house, a fine marble structure built 1854, cost $150,000. One of the state hospitals for the insane, with 20 buildings, and accommodations for 1,600 patients, is in the n. part of the town. There are more than 80 manufacturing establishments, which employ a total of 3,500 hands. Among articles made are cotton and woolen goods, carpets, shirts, hosiery, nails, tacks, glass ware, and bricks. There are also flour-mills, and several blast furnaces and rolling-mills. Three bridges across the Schuylkill lead to the borough of Bridgeport on the other bank. N. was named for Isaac Norris, who bought from William Penn the land on which it is built. It was incorporated 1812, enlarged 1853. Pop. (1870) 10,753; (1890) 19,791; (1900) 22,265; (1910) 27,875.

NORRKÖPING, *nŏr′chö-pĭng:* first manufacturing town of Sweden after Stockholm; chief town of Linköping-Län, E. Gottland; at the junction of the Motala with the Gulf of Bravike, 58° 30′ n. lat., 16° 15′ e. long. It is a fine well-built town, with broad streets, large squares, and numerous churches and charitable institutions. The rapid river Motala, spanned by several substantial bridges and lined with commodious wharfs, affords large water-power, by which numerous systems of machinery are worked. The manufactures are cloths, stockings, starch, tobacco, soap, etc., while in the neighborhood are the extensive ironworks and cannon foundries of Finspäng. N. is called sometimes the Manchester of Scandinavia. Pop. 41,000.

NORROY, n. *nŏr′roy* [F. *nord*, north; *roi*, a king]: the title of the third of the three kings-at-arms, whose jurisdiction lies to the north of the Trent; the other two are Garter and Clarencieux.

NORSE, n. *nŏrs* [F. *Norse*, the anc. language of the Faröe, Orkney, and Shetland islands: Icel. *Norskr*, Norse]: the language of anc. Scandinavia, including Norway and Sweden, the Faröe, Orkney, and Shetland islands. NORSEMAN, n. *nŏrs′măn*, an inhabitant of anc. Scandinavia; a Northman.

NORSE LANGUAGE: see SCANDINAVIAN LANGUAGE.

NORSE′MEN, or NORTH′MEN: see NORMANS.

NORSE MYTHOL′OGY: see SCANDINAVIAN MYTHOLOGY.

NORTES, n. plu. *nŏrts* [Sp. *norte*, the north, the arctic pole]: the *northers* or cold dry winds, frequently prevailing from Sep. to March in the regions bordering on the Gulf of Mexico.

NORTH, n. *nŏrth* [Icel. *nordr;* Dut. *noord;* Ger. *nord;* F. *nord*, the north]: one of the four cardinal points; the parts lying toward the north pole of the earth; the direction toward the north pole—in the northern hemisphere, the direction opposite the sun at noon—in the southern, the parts in the direction of the sun at noon: ADJ. being in or belonging to the north. NORTH STAR, the star always seen in the north; the pole-star or polar star. NORTH WIND, the cold wind that blows from the north in the northern hemisphere—a warm wind of the southern hemisphere. NORTHEAST, n. *-ēst′*, the direction between the north and the east: ADJ. pertaining to the northeast, or coming from that point. NORTHEASTER, n., wind blowing from the northeast; a northeasterly gale: in *numismatics*, name given to the silver shillings and sixpences coined in New England in the reign of Charles I., from the letters N. E. (New England) stamped on one side. NORTHEAST′ERLY, a. *-ēst′ėr-lĭ.* NORTHEAST′ERN, a. *-ēst′ėrn*, in a direction to the northeast. NORTHERLY, a. *nŏrth′ėr-lĭ*, lying or looking toward the north; coming from the north: AD. from the north, or toward it. NORTHERN, a. *nŏrth′ėrn*, lying toward the

north or in that direction. NORTHERN LIGHTS, a name for the streamers or aurora borealis, as they appear in the north. NORTHERNMOST, a. situated at the point farthest north. NORTHING, n. *nŏrth'ĭng*, tendency or distance northward—applied to a planet; difference of latitude made by a ship in sailing northward. NORTH'MAN, n. one from the north; an anc. Scandinavian (see NORMANS). NORTH'WARD, a. *-wėrd*, being in the direction of the north. NORTH'WARD, or NORTH'WARDS, ad. *-wėrdz*, or NORTH'WARDLY, ad. *-lĭ*, in a northern direction. NORTHWEST, n. *nŏrth-wĕst'* or *nŏr-wĕst'*, the point between the north and west: ADJ. pertaining to the point between north and west. NORTHWEST'ERN, a. *-wĕst'ėrn*, in the direction of the point between north and west. NORTHWEST'ERLY, a. *-lĭ*, toward the northwest; from the northwest. NORTH POLE, the northern extremity of the earth's axis. NORTH POLE OF THE HEAVENS, that pole of the heavens toward which the north pole of the earth is directed. NORTH FRIGID ZONE, the zone or belt of the earth which is contained between the north pole and the arctic circle. NORTH TEMPERATE ZONE, the zone of the earth contained between the tropic of cancer and the arctic circle. NORTHWEST PASSAGE, a passage for ships from the Atlantic Ocean into the Pacific, or the reverse, long sought (see NORTHEAST AND NORTHWEST PASSAGES). NORTHERN HEMISPHERE, hemisphere of the earth to the north of the equator. NORTHERN DRIFT, the glacial drift or erratic bowlder-group, so called because the materials seem to have been brought by polar currents from the north, or because found only in the more northern countries.

NORTH, CHRISTOPHER (pseudonym): see WILSON, JOHN.

NORTH, FREDERIC, Lord, second Earl of Guilford: English prime-minister: 1732, Apr. 13—1792, Aug. 5. He was educated at Eton, and at Trinity College, Oxford. His father, Baron Guilford, descendant of Roger, Baron North (*temp.* Henry VIII.), was created an earl 1752. N. entered the house of commons at an early age, was made a lord of the treasury 1763, and inherited the tory politics which, in the days of Charles II., had placed his ancestor in the highest ranks of the law and the state. It was his boast in the house of commons, that 'since he had had a seat there he had voted against all popular, and in favor of all unpopular measures.' On the death of Charles Townshend, 1769, he was made chancellor of the exchequer and leader of the house of commons, a post for which he was well qualified by his eloquence, good humor, wit, and readiness of resource. His folly was, however, one of the immediate causes of the American War of Revolution. Earl Russell, in *Life and Times of C. J. Fox*, says that 'for £100,000 a year of revenue George Grenville provoked America, and that for £16,000 a year of revenue Lord North lost America.' In 1770 he succeeded the Duke of Grafton as prime-

minister. As a minister he was too ready to surrender his own judgment to that of George III., who, with a narrower understanding, had a stronger will, and was determined to subdue America. N. was called by Horace Walpole the ostensible minister; the real minister was the king. N. had to encounter an ardent and powerful opposition, led by Charles James Fox and supported by Burke. It has since been proved that N. 'so early as 1776 was of opinion that the system he was pursuing would end in ruin to the king and to the country.' In 1778, he renounced the right of taxing the colonies. In 1782, it being impossible to carry on the war with America any longer, N. resigned. 'A more amiable man never lived,' says Earl Russell; 'a worse minister never since the Revolution governed this country.' With N.'s retirement came to an end George III.'s scheme of governing the country by his own will, and ruling the house of commons by court favor and thinly disguised corruption. N. was succeeded by the Marquis of Rockingham, on whose death Lord Shelburne became premier. Fox's dislike of the terms of peace with America led him to enter into a coalition with N., whom he had for so many years inveighed against as a minister without foresight, treacherous, vacillating, and incapable. N. and Fox took office under the Duke of Portland 1783, but the coalition destroyed Fox's popularity, and the Portland administration lasted only a few months. N. was afflicted by blindness during the last five years of his life. He succeeded to the earldom of Guilford, 1790, on the death of his father; but has continued to be generally known by his courtesy-title, Lord North.

NORTH RIVER: see HUDSON RIVER.

NORTH, WILLIAM: soldier: 1755–1836, Jan. 3; b. Fort Frederick, Me., son of John N., commander of Fort Frederick 1751, and Fort St. George, Thomaston, Me., 1758. William entered the American army 1775; served under Benedict Arnold in the Canadian expedition of the same year; 1777, May, was appointed capt. in a Mass. regt., and took part in the battle of Monmouth; 1779 was aide-de-camp to Baron Steuben, whom he aided to introduce his disciplinary system into the Amer. army; received congressional appointment as maj. 2d U. S. regt. 1786, Oct. 20; became adjt.gen. of U. S. army 1798, July 19, ranking as brig.gen.; was mustered out 1800, June 10. Meanwhile he served as speaker of the N. Y. assembly and entered the U. S. senate as federalist, serving 1789, May 21—1799, Mar. 3. Baron Steuben bequeathed most of his property to Gen. N., who shared it with his military companions. He married Mary, daughter of Judge James Duane. He belonged to the Soc. of the Cincinnati. He died in New York.

NORTH ADAMS: Mass., city in Berkshire County; on the Hoosac River and on the Boston & M. and the Boston & A. R.R.'s; about 50 miles northwest of Springfield. It was settled in 1765 and was part of Adams until 1878 when it was incorporated as a town, and in 1895 was chartered as a city. It includes the villages of Brayton Greylock, Beaver, and Blackington.

It is situated in a beautiful section, amid the Berkshire Hills, at the base of Greylock, the highest peak in the State. In the western part of the city may be seen the site of old Fort Massachusetts, captured in 1746 by French and Indians under command of Vandreuil. Hudson Brook and its natural bridge are points of interest, and near is the famous Hoosac Tunnel. The chief industrial establishments are machine-shops, cotton and woolen mills, boot and shoe factories, print goods factories, creameries, and cigar factories. The trade is chiefly in manufactures, farm and dairy products. It has a city hospital, good municipal buildings, and a number of fine church edifices. The educational institutions are a State Normal School, high schools, public and parish schools, and the North Adams Library. The charter of 1895 provides for a mayor, who holds office one year, and a council. The school committee, assessors, and library trustees are elected by popular vote. The city owns and operates the waterworks. Pop. (1910) 22,019.

NORTH AMERICA. During 1906 the earliest authentic accounts of Amundsen's voyage (1903-5) through the Northwest Passage were received, and this continent on its northern side was for the first time unmistakably defined; for, while it is true that previous exploration had shown approximately the path a ship might follow, no vessel except Amundsen's *Gjoa* has actually passed between the three oceans and the North American mainland. The track of the *Gjoa*, therefore, marks a continental boundary—a channel of open water along the mainland in the latitude of the magnetic pole and about as far from the geographic north pole as are the northern coasts of Siberia and of Norway. The channel is open probably every year for a short time during summer; but still further northward—or, let us say, between the magnetic and geographic north poles—lies the Arctic or Polar Archipelago, permanently ice-bound.

The eastern or Atlantic and western or Pacific limits of this continent are described in other articles. At present we would, in passing, mention only the proximity of the numerous Atlantic ports to Europe, and of the relatively few Pacific ports to the great Asiatic countries: facts which are sometimes regarded as the main features of North America's fortunate situation. A still more favorable circumstance, or, strictly speaking, a more exceptionally favoring circumstance, will become apparent if we study somewhat attentively the southern boundary. The fact that world trade-routes cross North America is an advantage shared with some other lands; the geo-

NORTH AMERICA
SCALE OF MILES
100 0 200 300 600
Longitude West from Greenwich
G 120 H 110 J 100 K 90 L 80 M
EQUATOR
Arctic Circle
TROPIC-OF-CANCER
DOMINION OF CANADA
ALASKA
GREENLAND
(To Denmark)
Baffin Bay
Davis Strait
Hudson Strait
Hudson Bay
James Bay
Labrador Peninsula
Banks Land
Parry Is.
Melville Sound
Great Bear L.
Great Slave L.
L. Athabasca
L. Winnipeg
Great Salt L.
Gulf of California
Lower California
Gulf of Mexico
Caribbean Sea
Yucatan
Cuba
Jamaica
Haiti
Central America
South America
Mexico
Guatemala
Honduras
Nicaragua
Costa Rica
Panama
Colombia
Peru
Ecuador
Quito
Bogota
Caracas
Trinidad
Bahama Is.
Florida
Pacific Ocean
Atlantic Ocean
Arctic Ocean
Bering Str.
Behring Sea
Alaska Pen.
Aleutian Is.
Kodiak I.
Alexander Archipelago
Queen Charlotte Is.
Vancouver I.
Prince of Wales I.
Revillas Gigedo Is.
Galapagos Is.
Ottawa
Washington
New York
Chicago
San Francisco
New Orleans
Havana
Kingston
Mexico
Guatemala
Managua
San Jose
Panama
Bogota
Quito
Lima
Caracas
Trinidad
Greenland
Iceland
Reykjavik
Godthaab
Julianshaab
Frederikshaab
Holstein borg
Disko I.
Upernavik
Melville Bay
Baffin Land
Ellesmere Land
Grinnell Land
Grant Land
Hall Land
Washington Land
Crocker Land
Axel Heiberg Land
Lignes Land
Prince Patrick I.
Banks Land
Victoria Land
Wollaston Land
Prince Albert Land
Prince of Wales Land
Cockburn Land
Baffin Land
Melville Peninsula
Boothia Land
Somerset I.
Prince of Wales Str.
Victoria Str.
Franklin B.
Lancaster Sd.
Barrow Str.
Jones Sd.
Smith Sd.
Kane Basin
Kennedy Channel
Robeson Channel
Nares Str.
Cumberland Sd.
Frobisher B.
Hudson Str.
Foxe Channel
Foxe Basin
Southampton I.
Coats I.
Mansfield I.
Fox Land
Hall Land
Melville Land
Prince Regent Inlet
Boothia Gulf
Committee B.
Coronation G.
Dease Str.
Simpson Str.
Dolphin and Union Str.
Queen Maud G.
Victoria I.
Wollaston Land
Prince Albert Land
Banks Land
Melville I.
Prince Patrick I.
Lignes Land
Parry Is.
Ellesmere Land
Grinnell Land
Grant Land
Hall Land
Washington Land
Crocker Land
Axel Heiberg Land
Ellesmere I.
Grant Land
Grinnell Land
Hall Land
Washington Land
Crocker Land
Axel Heiberg Land
Lignes Land
Prince Patrick I.
Banks Land
Victoria Land
Wollaston Land
Prince Albert Land
Prince of Wales Land
Cockburn Land
Baffin Land
Melville Peninsula
Boothia Land
Somerset I.
Prince of Wales Str.
Victoria Str.
Franklin B.
Lancaster Sd.
Barrow Str.
Jones Sd.
Smith Sd.
Kane Basin
Kennedy Channel
Robeson Channel
Nares Str.
Cumberland Sd.
Frobisher B.
Hudson Str.
Foxe Channel
Foxe Basin
Southampton I.
Coats I.
Mansfield I.
Fox Land
Hall Land
Melville Land
Prince Regent Inlet
Boothia Gulf
Committee B.
Coronation G.
Dease Str.
Simpson Str.
Dolphin and Union Str.
Queen Maud G.
Victoria I.

graphic dependence of the tropical continents of the New World is, on the other hand, an unmatched fact.

We shall see that exploitation of tropical America by North Americans, and, ultimately, governmental unification of the Americas, are the results to be expected in view of the ease of communication by the inland waterways of North and South America and the comparative isolation, or remoteness from world trade-routes, of the latter.

Southern Boundary, Transportation, and Communication.—It has been shown that from the point of view of a geologist North America does not extend below Florida and Yucatan. Very commonly even Mexico, simply because it is a Latin-American country, is considered to lie outside of the limits of North America, and we hear the phrase 'North America *and Mexico*.' On the other hand, in a scholarly German work, entitled *Die Bevölkerung der Erde* (issued as Supplement No. 146 to *Petermann's Mittheilungen*, Gotha, 1904, March 31), the author, Alexander Supan, states that the area of North America is 20,817,700 square kilometres and the number of inhabitants 105,714,000, or five inhabitants to one square kilometer; and Dr. Supan's elaborate calculations are based on the assumption that North America includes the West Indies, Mexico, Central America and Panama, as well as the United States and Canada, but not Greenland. The lack of a settled usage which appears in the foregoing examples is not hard to explain. The Gulf of Mexico and the Caribbean Sea (together forming the American Mediterranean) by which the continents appear, when one first looks at the map, to be divided and held apart, in reality hold the continents together. The American Mediterranean is part of that system of inland waterways the natural result of which has been already referred to. It will not bound: it will bind.

The view has been expressed that the initiative in the movement to form closer relations between the southern and northern continents would be taken by the former. It is proper, therefore, if this position be at all correct, to take the Latin-American point of view (or at least for a moment to try to understand the sentiment in countries which have failed to govern themselves well) when considering this undeveloped system of waterways. In 1904 some of the leading men of the South American countries advocated the construction of a canal, described by the Bolivian minister to the United States as 'Connecting the head of navigation in the southern tributaries of the Amazon with the head of navigation in the tributaries of the Rio de la Plata, thus making all-water inland communication through the heart of the continent from Venezuela on the north to Buenos Ayres on the south.' Even now, before any such canal has been constructed, an electric launch, carrying a small party of explorers up the Paraná river from Buenos Ayres to Corrientes, can proceed due north from the latter Argentine town through the geographical centre of South

America to Manáos, on the Amazon; thence via the Negro, Cassiquiare, and Orinoco rivers to the Venezuelan coast; over the American Mediterranean to New Orleans, and so up the Mississippi and Missouri to the head of navigation, or through the Great Lakes and the St. Lawrence river to the North Atlantic; the explorers bringing to the people of the Mississippi valley specimens of the products of the little known lands in the interior of the southern continent—bringing stories of adventure, stirring accounts of experience and observation there; bringing real information for the first time home to nearly every one.

The boat, it is true, must be constructed in such a manner that it may be carried around obstructions to navigation, since a portage between the Amazon and La Plata river systems and certain rapids in the Orinoco must be anticipated. And, because there is not at present a good, unbroken inland through route for larger vessels between the Caribbean Sea and estuary of the River Plate, the achievement thus suggested may appear at first sight to be of great scientific interest rather than of great practical value.

But the Orinoco link in the chain of waterways between Canada or our Northwest and the remote Southeast of South America has a value which it would be sheer folly to overlook. Let us see what consequences flow from the fact that this long voyage by riverways can be made in a specially designed boat, even under existing conditions.

The systems of rivers to which the mouths of the Orinoco give access—to which the Orinoco is our gateway and near approach—are equal to four or five Mississippis. When Columbus sailed past the mouths of the Orinoco he reasoned that such a torrent proved the existence of a land mass of continental dimensions. Humboldt, more than three hundred years afterward, found that the Orinoco was joined to an affluent of the Amazon. The people of North America, preoccupied with great enterprises elsewhere, let another century go by without taking the trouble to realize that the propinquity of the Orinoco, and no other circumstance whatever, would enable them to make good their claim of predominance in every part of the Western Hemisphere; that unless their footing in Venezuela should be assured, and peaceful conditions established so that, by way of the Orinoco, a practicable north-and-south route for ordinary river steamboats could be made through the heart of the continent, the entire eastern and central regions of South America would inevitably become commercial and political dependencies of Europe.

North Americans did not know or care to know that so long as the Orinoco should remain subject to the caprice of Venezuela, and therefore an unimproved route, it would be impossible to prevent the acquisition by military Powers from across the seas of a control in all the region beyond (practically the entire continent except

the coast strips west of the Andes and north of the equator), which would in effect be equal to territorial aggrandizement on an enormous scale—in other words, impossible to enforce the Monroe Doctrine as laid down by President Roosevelt in his speech at Chicago 1903, April 2.

Perforce we restate, though very briefly, one phase of the South American problem, now that we wish to appreciate the theoretical value of the inland route between Argentina and the Gulf of St. Lawrence.

The sailing distance from Pernambuco, Brazil, to some of the coast cities of Western Europe is less than to New York. Besides, the superior facilities for transportation between Europe and the eastern and southeastern coasts of South America are steadily increasing the advantage of the Europeans. Southeastern America, for all purposes of social intercourse, including nearly every kind of intimate association which, with the lapse of time, inevitably binds nations together, can be reached much more easily from Europe than from the great centres of population in North America, if the competition is limited to vessels navigating the Atlantic Ocean. Moreover, such inducements are offered to colonists from Europe that Argentina, for example, in 1901, was reenforced by three times as many immigrants in proportion to the total number of inhabitants as the United States. A large part of the southeastern coast receives from Europe ideas, manners, fashions, culture, immigrants. It is not probable that these conditions will be revolutionized by the completion of the Panama Canal. Now, within the coast region most subject to European influences are the mouths of four great rivers, natural avenues of internal transportation and communication piercing the continent. Only the fifth and last great river, which can be called an avenue in the same sense, the Orinoco, is comparatively near to North American ports. But the advantage for us in this case is enormous. From New York or New Orleans to the mouths of the Orinoco the sailing distance is only one-half as great as the distance between western European ports and the nearest South American rivers or important harbors.

In the vast central regions precocious streams, endowed almost from the start with the volume that elsewhere characterizes full grown rivers, run side by side, in opposite directions, approaching each other so nearly that they furnish a choice of almost continuous waterways between the far south and the north coast. As all know, the rainfall is one of the trustworthy things in the central part of South America. Wherever canalization is required, engineers will find that there is available for the purpose an inexhaustible supply of water which can be directed into the best natural channels, for the development of that mode of transportation in respect to which South America above the Tropic of Capricorn can be made to excel all other inland regions, whether of the Western Hemisphere or the Eastern. This

applies equally to the upper Paraguay and Paraná, and to the country north of the Amazon, where important works are required at several points. See SOUTH AMERICA

There is no reason to doubt that, on the completion of the labors of the engineers, river steamers of large size could follow the course of the launch above described, besides penetrating nearly all other parts of the continent.

The Argentina-Venezuela and Louisiana-St. Lawrence route in theory changes the position of North America in relation to the southeastern continent, removing the disadvantage and inferiority to which we have referred.

For the South Americans the existence of this incomparable system of inland water routes is a fact of vital importance. In it is to be found the only compensation for the remarkable absence of good harbors on the South American coasts—for there are very few points on either of those coasts, below Panama and Georgetown, that could ever be made attractive to foreign commerce, even if they were not situated at so great a distance from the world trade-routes. The conclusion seems to be quite clear: The southern boundary of North America must be drawn below the Caribbean, because there is otherwise no reasonable prospect of developing the equatorial regions. For railways, canals, telegraph, etc., see articles MEXICO; UNITED STATES; and CANADA.

Commerce.—See articles IMPORTS AND EXPORTS, AMERICAN; UNITED STATES; CANADA; MEXICO.

Political Divisions, Geology, Climate, Rainfall, Natural Sections, Flora, and Fauna.—See article AMERICA.

History.—See AMERICA; also articles UNITED STATES; CANADA; MEXICO.

Ethnology.—The most important fact to be considered under this sub-title is that European race elements have blended to such an extent that it is impossible at the present time to state accurately the proportions of the white races in the population of the continent. Figures purporting to give this information should be rejected as fallacious. To illustrate this fact, let us select the German element in the United States, which has been studied rather more thoroughly, perhaps, than any other during the last few years.

In 1904 the quarterly publication of the German-American Historical Society of Illinois, entitled *Deutsch-Amerikanische Geschichtsblätter*, contained an article by Mr. Ernest Bruncken in which the assertion was made that 'the German element of the population of the United States at the present time produces only about one-third as many prominent men as it ought to, in view of its numbers'; and the author of the article, writing in German and addressing people who read that language more easily than any other, referred to his conclusion as though it were a thing not to be doubted—'a somewhat shameful or humiliating fact.' We shall consider this 'fact' briefly in connection with a recent book, also writ-

ten in German by an American citizen, *The German Spirit in the United States of America*, by Dr. Julius Goebel, formerly professor of German philology and literature at Leland Stanford Jr. University. With an enthusiasm that makes his book exceedingly readable, Professor Goebel calls upon *all* German-Americans to be united *as Germans*. In the preface he says that the greater part of the real work of colonization in North America was done by Germans, explaining this statement and supporting it by an extensive historical survey which shows 'that the opening of the vast western part of America was begun by the Germans of Pennsylvania and continued and completed by the masses of German immigrants eagerly following in their footsteps. True, the people of other nations—English, French, and especially Irish and Scotch—also participated in this pioneer work,' but the lion's share in the quiet colonizing which laid the foundations of America's wealth is ascribed to Germans. His contention is, that a race which in the childhood of America rendered the service he measures, or so earnestly tries to measure, should make its influence felt proportionately in the nation now arrived at man's estate. He thinks that the Germans should act as a mighty unit in the endeavor to preserve in the new nation the German conception of life, and above all the mother tongue.

A reply to such typical assertions or appeals, if it be quietly convincing, and not merely rhetorical, must be sought in a study of the records of the settlements and of the subsequent growth of population in the various parts of the country. The records will aid us to form a clear idea in regard to the *limitations* of our knowledge of the ancestry of German-Americans and of those from whom the writers mentioned above seek to distinguish German-Americans. Fortunately a scholarly presentation of the results of such studies lies before us, in the form of a series of articles contributed to the *Deutsch-Amerikanische Geschichtsblätter* during 1903 by Mr. Emil Mannhardt; and we adopt Mr. Mannhardt's conclusions because that homœopathic course seems uncommonly appropriate.

Mr. Mannhardt says that in the year 1790 German blood ran in the veins of about one-fifth of the population of the United States. In 1830 the Anglo-Saxon-Puritan element numbered 2,964,717; the German element, 2,695,-167; and the American population in which the several European strains had already become so thoroughly blended as to be no longer easily distinguishable, 4.852,-717. At the century's end he finds in the United States 25,477,583 Germans, as compared with 12,713,036 descendents of the 'American' inhabitants in 1830, and 12,118,640 Anglo-Saxons. The Teutonic element (Germans, Scandinavians, Dutch, and Belgians) is given as 43 per cent. of the total white population.

But very little reflection upon the foregoing figures will be required to convince our readers that in the

course of a century a large part of the German element must have become by intermarriage thoroughly amalgamated with the descendants of British colonists and the nineteenth-century immigrants from Great Britain. It is a fair presumption that the influence of German blood may be traced in the careers of very many of the prominent Americans whose names give no certain indication of their German origin, or of German blood derived through some ancestress. An analysis of Mr. Mannhardt's figures shows, furthermore, that the appeal to German-Americans to unite *as Germans* is addressed to at least twelve or thirteen millions of people whose ancestors were citizens of the United States before 1830.

A full statement as to immigration after 1821, showing both percentages and the total number of persons reaching the United States from foreign countries, will be found in the article IMMIGRATION. The following list of countries from which currents of immigration have flowed to North America is not quite complete, yet suggestive enough: Ireland, England, Scotland, Germany, Norway, Sweden, Denmark, Italy, Russia, Poland, Canada, Newfoundland, Spain, France, Austria-Hungary, Holland, Belgium. In this connection see article NEGRO IN AMERICA.

Consult Farrand, *Basis of American History* (1904); Semple, *American History and Its Geographic Conditions* (1903).

NORTH AMERICAN INDIANS. See INDIANS AMERICAN.

NORTH AMERICAN PHALANX: the most important colony founded by the Fourierists in the United States. It was organized in 1843, and located in Monmouth County, N. J., about 40 miles south of New York. The organization was on the joint stock principle, and all the members were engaged in the co-operative labor of the colony; they were paid a certain amount for labor, for talent (or administration) and for capital invested; the rule was to pay the highest prices for the hardest and most disagreeable labor. The labor was at first mostly agricultural, products being sold outside the colony; but later mills were built and a considerable amount of manufacturing done. A common school education was provided. The life was simple and pleasant, there was a library and reading room, but the colony lacked many of the elements of culture that distinguished the life of Brook Farm (q.v.). The management was good, and for many years the colony prospered; in 1853 dissensions resulted in a secession of some of the members, and the founding of a new phalanx; in 1854 the mills were burned down, a serious loss that badly crippled the colony; and in 1856 the organization was formally dissolved. Consult Noyes *History of American Socialisms.*

NORTHAMPTON: Mass., city, county-seat of Hampshire County; on the Connecticut River, and on the New York, N. H. & H. and the Boston & M. R.R.'s; 18 miles

north of Springfield, 109 miles west of Boston, and about 140 miles from New York city. The largest part of the city is known as the 'Center,' and the remainder includes the villages of Bay State, Florence, and Leeds. Nearby are Mount Holyoke and Mount Tom, both with electric railroads to the summit. The city is on a height which commands a fine view of the river valley. It was settled 1654, May 14, by English colonists, and was named after Northampton in England. Jonathan Edwards (q.v.) lived here for some years. It was incorporated on October 18 of the same year, and chartered as a city 1884, Jan. 1. It is in a productive agricultural section, but it has extensive manufacturing and commercial interests. The chief manufacturing establishments are sewing-silk mills, basket and paper box factories, lumber mills, brush factory, hardware works, hosiery mills, sewing machine and furniture factories, machine shops, pulp mills, emery wheel works, and foundries. There are about 3,000 employees in the manufactories. The trade is principally in the manufactured articles and farm products. It has a number of fine buildings and prominent institutions, among which are the Dickinson Hospital, the State Asylum for the Insane, and the opera house. The last mentioned, a gift from a native of the city, is owned and managed by the municipality. There are a number of fine church buildings. The educational institutions are Smith College (q.v.); the Burnham Classical School for Girls; the Clarke Institute for Deaf Mutes, endowed by John Clarke; public and parish schools; three public libraries, gifts of natives of Northampton, and the 'Home Culture Club,' founded by George W. Cable (q.v.), and assisted by a gift of $50,000 from Andrew Carnegie. The educational advantages of this club have been of great benefit to a large number of men and women; unique features are the instructions in household arts and amusements. The three national banks have a combined capital of $650,000, and the three savings banks have a total deposit of $4,975,000. The 'Smith Charities' has peculiar features that make it a most remarkable and beneficent institution. It was founded by the will of a public benefactor, who desired to aid a special class of worthy persons. On certain conditions young men and women and widows receive annual gifts of money, young women receive gifts when they marry, and young men, who learn a trade, receive a certain sum of money when they attain the age of 21. The charter of 1883 provides for a board of aldermen and a council of 21 members elected annually by the people. The board of education and the trustees of the Forbes Library are chosen by popular vote. The city owns and operates the waterworks. Pop. (1910) 19,431.

NORTHAMP'TON: market-town, and parliamentary and municipal borough, capital of the county of Northampton, England; on a rising ground on the left bank of the Nen, 67 m. n.w. of London by railway. In the

centre of the town is a spacious market-square. The principal edifices are the shire-hall, the new and handsome town-hall, the corn exchange, and numerous churches, several of which are unusually interesting—e.g., St. Peter's, recently restored and beautiful specimen of enriched Norman; and St. Sepulchre's, much improved 1865, one of the very few round churches in the empire, and referred to the 12th c. The hospitals of St. John and St. Thomas were religious houses prior to the Reformation. Boot-and-shoe making, employing about 3,000 persons, is the principal trade. Leather is made, and hosiery and lace are manufactured. Iron and brass foundries are in operation, and brewing is carried on. Two markets are held weekly—a general one on Wednesday, and one for cattle on Saturday. Pop. (1901) 87,021.

Northampton, a very ancient town, was held by the Danes at the beginning of the 10th century, and was burned by them 1010. After the Conquest, it was bestowed on Simon de St. Liz. Its castle was besieged by the barons 1215, during the civil wars of King John. It was the scene of a great battle 1460, July 10, during the Wars of the Roses, in which the earls of March and of Warwick defeated the Lancastrians.

NORTHAMP'TONSHIRE: a central county of England, extending lengthwise n.e. and s.w. 70 m. from Lincolnshire to Oxfordshire; breadth varying from 7 to 26 m.; 629,912 acres, or about 982 sq. m. Its surface is marked by gently undulating hills, alternating with well-watered vales. The chief rivers are the Nen and the Welland, both of which flow n.e., and fall into the estuary of the Wash. The county is traversed by the London and Northwestern, the Great Northern, the Eastern Counties, and other railways; and communication by water is maintained by the Union, Grand Junction, and other canals, and by the rivers. The climate is mild and healthful; the soil, black mold in the fen districts, in the n.e., and brown loam on the uplands, is very productive. White and green crops are abundant, and on the rich pastures cattle are extensively reared for the London market. Hampshire is the usual name not of Northamptonshire, but of *Southamptonshire*. Pop. (1901) 207,467.

NORTH ATTLEBORO, *ăt'l-bŭr-ō:* Mass., town in Bristol County: on the New York, N. H. & H. railroad; about 30 miles southwest of Boston. It includes the villages of Oldtown, Adamsdale, Falls Village, and Robinsonville. It was settled in 1637 and incorporated in 1887. The chief industries of the town are connected with the manufacturing and sale of jewelry. It has establishments for the manufacture of boxes, buttons, braid, cotton yarn, rope, silverware, machinery and supplies for the jewelry business. Some of the prominent buildings are the G. A. R. Memorial Hall, the Holmes Memorial building, the high school, and the Richards Memorial Library. The government is administered by town meet-

ings. The town owns and operates the electric-light plant and the waterworks. Pop. (1910) 9,562.

NORTH BAY: Canada, town in Nipissing district, in the Province of Ontario; on the north shore of Lake Nipissing, and on the Grand Trunk and the Canadian P. R.R.'s. A United States consul is stationed here. It is a favorite resort for sportsmen on account of the abundance of fish and small game. Pop. (1901) 2,530.

NORTH BRAD'DOCK: Pa., borough in Allegheny County; on the Pennsylvania railroad; about six miles east of Pittsburg and two miles east of Homestead. It was a part of Braddock until 1897. It has extensive steel rail interests, but a portion of the borough is a residential reserve. The government is vested in a burgess, who holds office three years, and a council. Pop. (1900) 6,535; (1910) 11,824.

NORTHBROOK, *nawrth'brûk*, Lord (Sir Francis Thornhill Baring): 1790-1866, Sep. 6; b. England; eldest son of Sir Thomas Baring, Bart., and grandson of Francis Baring, founder of the banking-house of Baring Bros. He was educated at Winchester School, and Christ Church, Oxford; was called to the bar 1823; entered parliament as member from Portsmouth 1826, representing that constituency as a whig 39 years. He was lord of the treasury 1830-34, joint sec. to the treasury 1835-39, and chancellor of the exchequer 1839-41. He was first lord of the admiralty in the cabinet of Lord John Russell 1846-52. He was raised to the peerage as Baron Northbrook of Stratton 1865, December.

NORTH'BROOK Lord (Thomas George Baring): born 1826, Stratton Park, near Winchester, England; d. London 1904, Nov. 15; eldest son of the first baron. He graduated at Oxford 1846; succeeded to the barony 1866, Sep. He was successively private secretary to Mr. Labouchere in the board of trade, Sir George Grey in the home office, and Sir Charles Wood in the India board and the admiralty. He entered parliament as a liberal 1857; was lord of the admiralty 1857-8; under-secretary of state for India 1859, June—1861, Jan.; secretary for war from latter date to 1866, June; and again, on accession of Mr. Gladstone, 1868, Dec.—1872, Feb., when he was appointed viceroy and governor-general of India. He resigned 1876, and was created viscount. In 1880 he was first lord of the admiralty in Gladstone's cabinet.

NORTH CAPE: promontory in the Arctic Ocean; lat. 71° 10′ n., long. 25° 50′ e.; noted as the most northerly point of Europe. It consists of a long stretch of steep rocks, jutting into the sea and reaching a height of 970 ft., the top showing a large area of table-land and a series of picturesque pyramidal peaks. It forms the n. extremity of Magerŏe Island, which is separated from the mainland of Norway by a narrow channel. See Magerŏe.

NORTH CAROLINA, *kăr-o-lī'na:* state; one of the United States of America; 12th of the original 13 to adopt the constitution (1789, Nov. 21) by which the Union was formed; a member of the Confederate states 1861, May 21—1865, April 26; fully restored to the Union 1868, July 11.

Location and Area.—N. C. lies midway of the Atlantic coast of the United States; lat. 33° 50′—36° 33′ n., long. 75° 27′—84° 20′ w.; bounded n. by Va., n.w. by Tenn., s. by Ga. and S. C., and e. by the Atlantic; has extreme width toward the coast of 245 m. from n.e. to s.e., and a shore-line of over 300 m.; longest n. and s. line across the state 185 m., w. end 100 m., and mountain border running s.w. 185 m. long; 52,286 sq. m. (3,620 of water), 33,463,040 acres; extent of navigable streams about 550 m.; cap. Raleigh.

Topography.—The coast region, 100 to 120 m. wide, 20,000 sq. m., is a great plain, somewhat undulating and hilly toward the w. and near the rivers, but toward the ocean a level hardly 20 ft. above the sea, much broken by extensive sounds, bays, lakes, sluggish and muddy rivers very wide toward their mouths and open to the tide for 50 or 60 m. inland, and marshes and swamps estimated to cover 3,000,000 acres. The coast-line is an immense wall of sand thrown up to the height of 75 to 100 ft., and broken through in a few places by inlets connecting the ocean with the extensive sounds lying behind this sand rampart. Currituck Sound lies parallel to the coast, in the extreme n.e., for 50 m. n. and s.; Albemarle extends 50 m. inland from the s. end of Currituck; and the waters of both pass through Roanoke and Croatan sounds, which inclose Roanoke Island, into the n.e. end of Pamlico Sound, which extends 80 m. s.w., filling the great coast-angle of which Cape Hatteras is the point. Core Sound is a narrow extension of the waters of Pamlico, s.w. 30 m. to Cape Lookout; and the same water reaches w., inside the coast-wall, about 40 m. farther, with one inlet opening to the ocean. The other inlets connecting all these sounds with the sea are four: Ocracoke and Hatteras, below Cape Hatteras; and New and Oregon, n. of the cape. The Great Dismal Swamp covers 150,000 acres n. of Albemarle Sound, reaching into Va.; and s. of Albemarle the Alligator or Little Dismal Swamp has nearly the same extent. The Alligator river, which enters Albemarle Sound on the s., is for 20 m. a broad arm of the sound; and similar arms of Pamlico Sound, at its s.w. end, are formed by the wide courses of the Pamlico and Neuse rivers. The Roanoke river enters the e. end of Albemarle Sound from the n.w., and the Chowan from the n. Cape Fear river falls into the Atlantic at Cape Fear, after an e.s.e. course for nearly 300 m. The Tar river is the upper stream which at its widening into a broad water is called the Pamlico. By all these rivers there is good navigation across the coast region of N. C. into the border of the middle region, which is a country of hills and rolling uplands and river valleys,

Area in Square Miles, 52,250
Population, 1,893,310
Number of Counties, 97
Capital of State, Raleigh
NORTH CAROLINA
SCALE OF MILES
0 10 20 30 40 50
Western Part of
NORTH CAROLINA
Same Scale as Main Map
ATLANTIC OCEAN
Albemarle Sound
Pamlico Sound
Raleigh Bay
Onslow Bay
Cape Fear
C. Hatteras
C. Lookout
Hatteras Inlet
Ocracoke Inlet
New River Inlet
SMITHS I.
SANDY I.
NORTH I.
ROANOKE I.
BODIES I.
HATTERAS ISLAND
Currituck Sd.
Pamlico R.
Neuse R.
Cape Fear R.
Roanoke R.
Chowan R.
Yadkin R.
Catawba R.
Broad R.
Pee Dee R.
Lumber R.
Waccamaw R.
Black Mts.
Great Smoky Mts.
Mt. Mitchell
Longitude West 79° 78° 77° from Greenwich
Latitude 36° 35° 34°
RALEIGH
Greensboro
Winston-Salem
Charlotte
Salisbury
Durham
Chapel Hill
Goldsboro
Wilmington
Asheville
Elizabeth City
New Bern
Fayetteville
Rocky Mt.
Kinston
Lenoir
Statesville
Hickory
Gastonia
Shelby
Rockingham
Laurinburg
Lumberton
Whiteville
Tarboro
Greenville
Washington
Plymouth
Edenton
Hertford
Currituck
Corolla
Manteo
Kitty Hawk
Nags Head
Buxton
Frisco
Avon
Rodanthe
Salvo
Hatteras
Ocracoke
Beaufort
Morehead City
Atlantic Beach
Swansboro
Jacksonville
Camp Lejeune
Havelock
Cherry Point
Maysville
Trenton
Kenansville
Warsaw
Clinton
Elizabethtown
Tabor City
Whiteville
Southport
Oak Island
Carolina Beach
Wrightsville
Scotts Hill
Topsail Sound
Holly Point
Columbia
Creswell
Belhaven
Pantego
Aurora
Bayboro
Oriental
Cedar Bay
Core Sound
Harbinger
Colington
Duck
Southern Shores
Kitty Hawk
Kill Devil Hills
Nags Head
Manteo
Wanchese
Roanoke I.
Bodie I.
Oregon Inlet
Pea Island
Rodanthe
Waves
Salvo
Avon
Buxton
Frisco
Hatteras
Ocracoke
Portsmouth I.
Core Banks
Shackleford Banks
Bogue Banks
Emerald Isle
Cape Lookout
Beaufort Inlet
Bogue Inlet
New River Inlet
Onslow Bay
Topsail I.
Figure Eight I.
Wrightsville Beach
Masonboro I.
Carolina Beach
Kure Beach
Fort Fisher
Cape Fear
Smiths I.
Bald Head I.
Oak Island
Holden Beach
Ocean Isle Beach
Sunset Beach
Calabash
Little River
Myrtle Beach
Conway
Georgetown
Winyah Bay
Santee R.
Pee Dee R.
Lumber R.
Waccamaw R.
Cape Fear R.
Neuse R.
Pamlico R.
Roanoke R.
Chowan R.
Yadkin R.
Catawba R.
Broad R.
Pee Dee R.
Lumber R.
Waccamaw R.
Black Mts.
Great Smoky Mts.
Mt. Mitchell
Longitude West 79° 78° 77° from Greenwich
Latitude 36° 35° 34°

raised at its e. border about 200 ft. above sea-level, and sloping upward to an elevation of about 1,000 ft., from which the mountains rise on the w. The area of this middle region is about 20,000 sq. m., and it especially shows, running from the n.w. to the coast region, a system of broad, upland watersheds, separated by wide valleys through which rivers descend, on their way from the mountains to the sea. The Catawba and Yadkin, with their tributaries, are most to the w. or s.w.; and farther e. or n.e. are the systems of the Cape Fear and Neuse, the Tar and Roanoke—giving an extent of valleys and streams, separated by broad-backed uplands, more than 300 m. in width from southwest to northeast.

At the w. or n.w. of the middle region, the Piedmont plateau, 60 to 75 m. wide, rises from 1,000 ft. above sea-level on its e. margin to 1,200 or 1,500 ft. at the foot of the mountains—a section of the Blue Ridge which rises steep, ragged, and broken 2,000 to 3,000 ft. above the w. edge of the plateau, with many high spurs sent out into the plateau, and a few irregular ranges quite crossing it, to the e. or the s. Beyond the Blue Ridge chain, which has a few summits—midway of its straggling course across the state from n.e. to s.w.—rising to nearly 6,000 ft., there lies a high trough—15 to 50 m. wide, 200 m. long from n.e. to s.w.—the lofty w. or n.w. wall of which is formed by the Great Smoky Mountains, a chain forming the chief southern extension of the Appalachians, on the boundary between N. C. and Tenn. This boundary chain is of 5,000 to 6,000 ft. elevation, with many of its summits 6,500 ft. and upward, but broken by cuts, through which six or seven rivers pass out of the great intermountain trough by channels as low as from 2,000 to 1,200 ft. above sea-level. The Hiawassee, at the extreme s.w., the Little Tennessee, Big Pigeon, and French Broad rivers are the chief streams which send their waters through these deep gaps into the valley of the Tennessee. The great plateau between the Smoky and Blue Ridge mountain chains is cut up by many lofty cross-chains, separated by deep cross-valleys or river-basins. These valleys have an elevation of 2,000 to 3,000 ft., with bench or plateau margins reaching 3,500 to 4,000 ft.; and the cross-chain summits are 5,000 to 6,500 ft. high. One of these, Mitchell's Peak, in the Black Mountains, is 6,688 ft. high, 400 ft. above the top of Mount Washington in N. H., and the highest point e. of the Mississippi. The number of rivers of N. C., with the amount of fall of the water-courses, creates an aggregate of water-power estimated to exceed that of all the steam-engines of the United States.

Climate.—In variety of equable, pleasant, and healthful climate, N. C. is one of the most favored regions of the globe: the death-rate is less than the average for the United States, and it embraces one of the two areas where consumption is unknown. An exception to the healthfulness of the climate is in the presence of malaria along some of the rivers in the lowlands. The coast re-

gion has a subtropical climate, and from this, going w. to the mountain region, the climate changes to that of New England, yet with the two great advantages of absence of humidity and of extreme cold in winter. The rainfall is 60 in. for the coast region, 45 for the middle, and 58 for the w. or mountain; yet the air is as dry as that of France, greatly favoring the cultivation of the vine, cotton, silk, etc. The average temperature for the coast, middle, and mountain regions is: summer 79°, 77°, 70°; winter 46°, 44°, 38°. The prevalent winds of the three regions are: coast s.w., middle n.w., mountain w. The state has almost complete immunity from violent atmospheric disturbances.

Geology.—The broad coast region shows over its whole extent a thin covering, from a few feet to 25 and 50, and sometimes to 100 and 200 ft., of tertiary sands, gravels, and clays, with rudely stratified earths and shingle beds toward the w. border, and frequent outcrops of marls, shell limestones, and coarse chalk beds in the water-courses and ravines throughout all its middle and e. parts. Beds of half-compacted greensand, sometimes filled with shells, show the cretaceous formation in the river beds and banks of the s. half of this region. Patches of shingle beds, clays, and gravels, of quaternary origin, are found here and there, overlying the tertiary mantle, and reaching at times a thickness of 30 to 50 ft. W. of the upper half of the coast-region tertiary beds lies a breadth, about 20 m. wide, of azoic slates and felsites, seen only where they have been uncovered, in the beds and bluffs of the larger water-courses; and w. of this, in the region of Raleigh, a like 20-m. breadth of azoic gneisses and schists. Next w. of these formations, and in the s. half w. of the coast-region tertiary beds, lies a long and narrow mesozoic belt, 5 to 6 m. wide, evidently a remnant of a broad, flat anticlinal which extensive erosion has elsewhere removed. It enters N. C. from S. C., a few m. w. of the Pedee river, and passing within 10 m. w. of Raleigh extends to within 15 m. of the n. border of the state. It forms a trough-like terrane showing triassic sandstones, conglomerates, clay-slates, and shales, several thousand ft. in thickness, with a s.e. dip of 10° to 20°, and carrying a 6-ft. seam of bituminous coal. A second belt of the same character, 2 to 4 m. wide, 40 m. long, lies along the valley of the Dan river, in a nearly e. and w. direction, near the n. boundary of the state. It carries a 3-ft. seam of semi-bituminous coal. This coal is triassic, not carboniferous, is of the best quality, and the 70 sq. m. of the two fields are estimated to contain 420,000,000 tons. The slate associated with the coal yields 30 to 40 gals. per ton of crude petroleum. To the w. of the first of these coal-bearing belts, a zone of azoic slates extends from n.e. to s.w. across the state, with a breadth of 20 to 40 m. The rest of the state to the w. shows azoic formations only, lying in zones parallel to the Appalachian axis—the Laurentian, Montalban, Huronian, etc., succeeding

ALBEMARLE SOUND, NORTH CAROLINA.

each other, in broad belts of granites, gneisses, and schists, with narrow separating belts of quartzites, limestones, sandstones, and slates.

The mineral wealth of N. C. is of great variety, and coextensive with the immense breadth of metamorphic rocks occupying the w. and middle regions of the state. Gold occurs both in veins and in placers from Cherokee co., in the extreme s.w., to Halifax co., on the Roanoke, within 110 m. of the n.e. corner of the state; and silver, copper, and iron are not less widely found. The best gold-bearing placers are in the s. half of the great midland slate belt, and among the foot-hills and spurs of the central part of the Piedmont plateau. The thickness of the deposits is slight, compared with those of Cal., being 5 or 10 to 20 ft. generally, and rarely 40 to 50 ft. The same midland region has also the best vein mines—e.g., the Gold Hill of Rowan co., discovered 1840, worked to a depth of 750 ft., and reputed the richest in the United States before the Cal. gold discoveries. There are notable silver mines also in this region, and copper veins are numerous, besides the copper ores frequently found in the gold veins. Both in the middle and the w. regions, ranges of magnetic and hematite iron-ore beds cross the state from n.e. to s.w. These ores are of high value, and much in demand for Bessemer furnaces. Limonite beds are widely found; spathic ore occurs with gold and copper in some of the midland mines, and black-band ore with coal. Most extensive and valuable mica mines in the mountain region, notably Mitchell co., have been worked since 1867, and furnish the chief supply of mica for both the United States and Europe. The same is true of the N. C. supply of corundum or emery. Both white and colored marbles are extensively found, and building-stones of every variety; also whetstone, millstone, and grindstone grits, potter's clay and fire-clay, and immense beds of peat in the coast region. There occurs also a great variety of other minerals of value in the arts, and nearly 20 different species of gems. Diamonds of fine water have been found; detached crystals of zircon, garnets, and graphite occur; also arsenic, antimony, bismuth, cobalt, and nickel. Ancient mines of unknown date and origin are found among the mountains; and in some of the river-courses, freshets have exhumed skeletons, burial urns, ornaments, weapons, and various utensils and implements of stone, pottery, and copper. Valuable mineral and warm springs in the w. section afford places of resort for both health and pleasure.

A special survey, 1886, showed a belt of valuable phosphate beds, 15 to 20 m. wide, entering from S. C. through Columbus co., extending n.e. 100 m. to the Neuse river, thence s. through Onslow co. to the ocean. The soils of N. C. are in variety and fertility adapted to a remarkably rich and varied flora. In the coast region, extensive tracts of swampy lands have a black peaty soil of great depth and of a richness that will give 50 to 60 bushels of In

dian corn to the acre for a hundred years in succession. The more upland soils of this region are moderately fertile sands and loams, interspersed with ridges or long patches of very sandy and sterile 'pine barrens.' On the benches and lower levels, especially along the borders of the streams, and shores of the sounds and bays, are wide and fertile alluvial tracts. In the middle and mountain regions, the soils are generally clayey, sandy, and gravelly loams, with a considerable proportion of clay soils, both on the uplands and in the numerous creek and river bottoms, which are very durable and productive. Even the highest and most rugged mountains are covered with soil and clothed with forests to their summits.

Zoology.—Deer, bears, the gray, red, and black foxes, wolf, opossum, raccoon, squirrel, and several species of rabbits, the bald and gray eagles, several species of falcons, the fish-hawk, buzzard, raven, crow, blackbird, pheasant, woodcock, dove, pigeon, lark, mocking-bird, and whip-poor-will are found in the w. and middle parts of N. C.; otters, beavers, swamp bears, and musk rate in the coast region; with quail, partridges, and other game plentiful in its forests, and wild fowl of every species on its waters—swans, geese, brant, pelicans, snipes, plover, and a great variety of ducks being specially abundant.

Agriculture.—N. C. yields all crops grown in both the n. and s. sections of the Union, its greatest being corn, cotton, and tobacco, of which the two last are particularly notable. Rice and sweet potatoes are also very valuable, as are the trucking industry and grape culture.

Timber.—The extent and value of the forests are particularly noteworthy, ranging from the palmetto, magnolia, and live oak around Wilmington to the fir, hemlock, and white pine in the mountains of the w. The vast quantities of pine and cypress, and of hard woods, especially oak, hickory, ash, walnut, and gum, have not only attracted new sawmills but have created large furniture factories at High Point and other places. Immense quantities of turpentine, rosin, tar, and pitch are also produced from the vast tracts of pine forests.

Fauna.—Deer, red and gray foxes, raccoons, squirrels, opossums, and rabbits are numerous, while wolves, bear, wildcats, beavers, and others are still to be found. Swan, geese, brant, and wild duck swarm in the sounds, bays, and rivers of the e. in the cold months, while in all parts of the State quail, snipe, woodcock, doves and wild pigeons, larks, and many other birds are numerous. The attraction to sportsmen has been so great that a close season for game has been enacted by the legislature, while an Audubon society has been authorized for the protection of birds.

Fisheries.—The shad and herring fisheries are especially valuable, there being over 25 counties interested

in this industry. Herring are mostly cured in salt and shipped in barrels, but the shad, striped bass, chub, perch, and other fish are shipped on ice, the large fisheries all maintaining their own ice factories. Upon the organization of the state fish commission in 1876, hatcheries were established which largely increased the catch of fish. More recently these have been taken over by the U. S. government, the young fish thus hatched being set free in all the principal waters of the state and in other states, some being shipped even to the rivers of the Pacific coast. The oyster and shell-fish industries in the e. waters are of great value.

Navigation.—Vessels drawing 24 ft. can ascend the Cape Fear river 30 m. to Wilmington, while the river is navigable 120 m. further to Fayetteville. The Roanoke is navigable 130 miles to Weldon, the Tar and the Neuse about 100 m. each, and the Chowan for 75 m., while two canals connect the Albermarle and Pamlico Sounds with Chesapeake Bay.

Manufactures.—The water-power of N. C., owing to the great non-navigable length of its rivers and streams, is very great, in fact, more than twice enough to manufacture the entire cotton crop of the South. Already the State has more cotton factories than any other State in the South, besides being a very large manufacturer of tobacco, the chief manufacturies of the latter being at Durham, Winston, Reidsville, and Henderson. Factories of all kinds have greatly increased, until to-day the total manufacturing output of the State aggregates about $150,000,000.

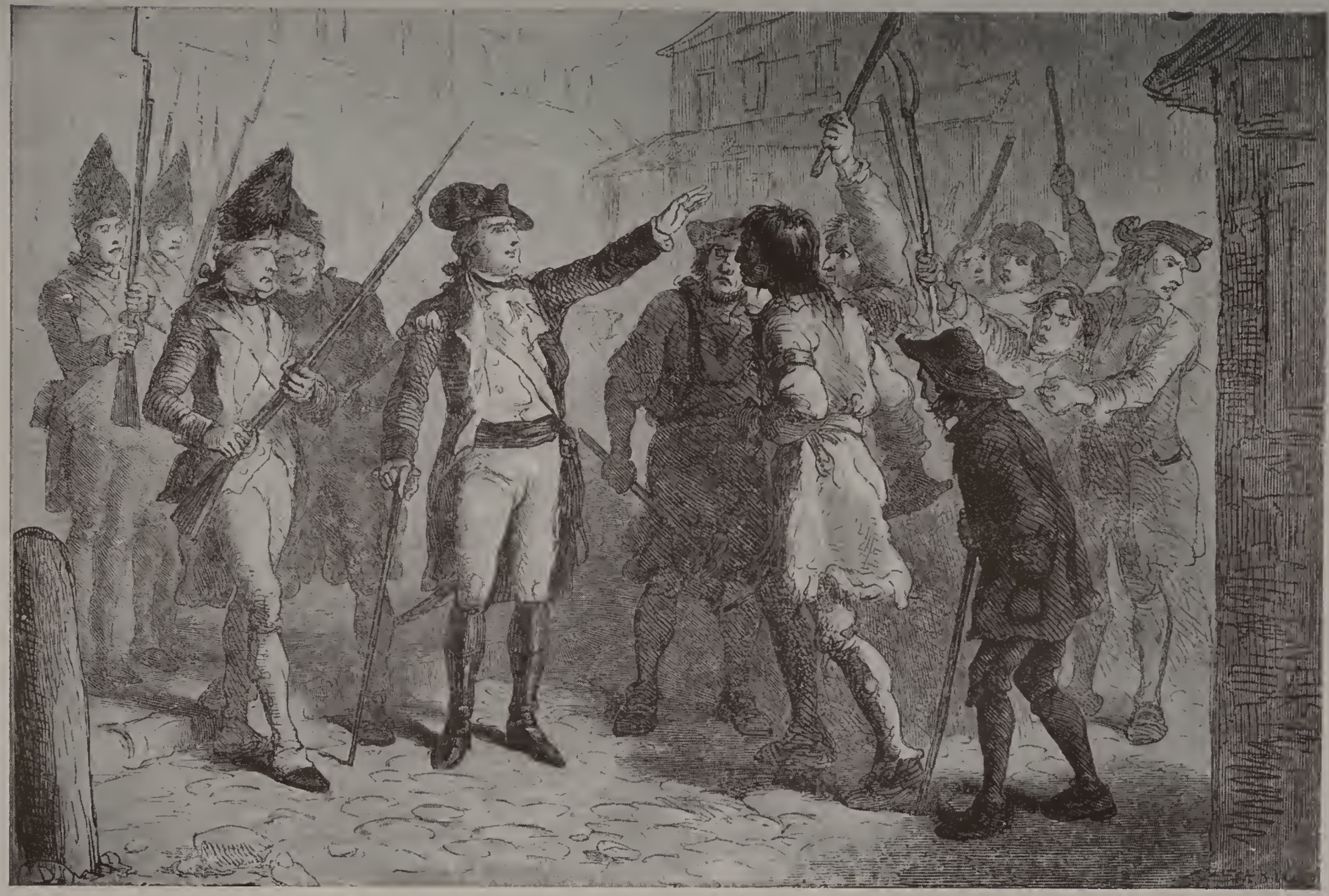
Minerals.—The State has areas of coal, copper, gold, mica, iron, corundum, kaolin and marl. The last is to be found only in the eastern part of the State, the others in the centre and west. Silver, lead, zinc, zircon, graphite and manganese are also found. The deposits of iron are widely distributed over the State, the most abundant kind being the magnetic. The Cranberry iron mine in Mitchell County yields an ore unsurpassed in the world. There are two bituminous coal fields—one in Chatham and Moore counties and the other in Stokes and Rockingham. Both are in close proximity to extensive deposits of iron. Gold is found in 29 counties, mostly in the centre and west of the State, and more than 40 mines are being worked. Up to the discovery of gold in California, North Carolina was the largest gold producing State in the Union: the total yield up to date has been nearly $40,000,000. Tin has been found in Cleveland County. At one time three-fourths of all the mica in the world was mined in this State and largely in Mitchell County. It is of a superior quality and plates three and four feet across are not unusual. Beautiful marble underlies large sections of Cherokee and Clay counties in the extreme west. Granite, sandstone, and porhyry are to be met with in large quantities, and superior stone for grist

mills is quarried in Moore County. Near Wilmington are valuable phosphate beds. The State produces more corundum than any other locality in the world and of the best quality. The valuable gems, diamonds, emeralds, rubies, garnets, amethysts, opals, agates, and hiddenites are found. A fine exhibition of minerals, gems, marbles and stones of all kinds is to be seen in the Museum of the State Agricultural Department at Raleigh. At Dunn's Mountain near Salisbury is an exhaustless supply of granite almost as white as marble, and at Mount Airy is an equally large quarry of light gray granite. Near Raleigh is the granite quarry from which the material for the State Capitol was taken. Indeed granite quarries of good quality are to be found in most of the counties and sandstone quarries are numerous. Mineral springs are numerous, the most noted being the Panacea Springs in Halifax County and the Seven Springs in Wayne in the east, while in the centre and west are the Hot Springs in Madison, the Sulphur Springs in Jackson, the Glen Alpine and Connelly Springs in Burke, the Vade Mecum Springs in Surry, the Lithia Springs in Lincoln, Cleveland Springs in the county of that name, Jackson Springs in Moore, and there are many others. Among natural objects of interest are Mount Mitchell, the highest peak on this continent east of the Rocky Mountains; Linnville and Cullasaja Falls; Hickory Nut Gap and the adjacent Chimney Rock; Table Rock and Paint Rock.

Railroads.—There is now an aggregate trackage of about 4,500 miles of steam railroad tracks in the State, with still more under contemplation.

Finance and Banking.—The total assessed valuation of all property in the State, including both personal and realty, is $565,005,223, the tax rate $2.50 per $1,000, and the bonded debt $7,200,500. There are about 70 national banks, nearly 200 State banks, about 25 savings banks, and a few private banks and loan and trust companies.

Government.—The present constitution, adopted in 1868, amended by a convention in 1875 and by several amendments submitted by legislatures since and ratified by the people, provides for an executive department consisting of a governor (not re-eligible), a lieutenant-governor, secretary of state, treasurer, auditor, superintendent of public instruction, commissioner of agriculture and commissioner of labor, all elected by the people for four years. There is also a commissioner of insurance elected by the legislature, and a corporation commission of three members elected by the people for a term of six years. The legislative department consists of 50 senators and 120 members of the house of representatives elected by the people every two years. The judicial department consists of a supreme court



GOVERNOR TRYON AND THE REGULATORS.

composed of a chief justice and four associates chosen by the people for eight years and 16 superior court judges, who are chosen for the like period by the people and who ride in rotation each of the 16 superior court districts into which the State is divided.

Education.—North Carolina was the second State to establish a State University, which it did in 1789 at Chapel Hill. It has now also the State Agricultural and Mechanical College at Raleigh and a State College for Women at Greensboro. These three constitute a complete system of higher education by the State. There is also a State Agricultural and Mechanical College for the colored at Greensboro. There are also many sectarian colleges, of which the Baptists have one at Wake Forest, the Presbyterians at Davidson, the Methodists at Durham, and there are others. There are also several colleges for women, and three colleges for the colored people. As early as 1825, the State provided a public school fund and in 1840 established a public school system. This now provides instruction in primary and intermediate grades, free of charge, to all children between the ages of 6 and 20. There is an annual appropriation for normal institutes for the instruction of both white and colored teachers. The public school system supported by State appropriations is supplemented by graded schools for free education maintained in all the larger towns by local appropriations. The public funds for education are divided between the whites and blacks per capita. Besides the State Library of 40,000 volumes, and the Law Library of the Supreme Court of 20,000 volumes, both at Raleigh, several towns have public libraries and the University and all the colleges maintain libraries. The State has also established libraries for the public schools in the rural districts.

Penal and Charitable Institutions.—The State has established a penitentiary at Raleigh, three insane asylums—one at Goldsboro for the colored people, the other two for the whites at Raleigh and Morganton. There is an Institute for Deaf Mutes for the whites at Morganton and one for the colored deaf, dumb and blind at Raleigh and an Institute for the Blind for the whites also at Raleigh.

History.—Sir W. Raleigh explored the coast 1584; sent a colony of 108 persons 1585, Apr., who attempted a settlement on Roanoke Island, but returned the next year; and sent a second colony 1587, but for some years left it uncared for and then could find no trace of it. A new start was made by Charles II., who made a grant 1663, Mar., to 8 lords proprietors, of all lands s. of Va., to a point now in Florida. Under a similar (ineffective) grant 1629, made by Charles I. to Sir Robt. Heath, the name Carolina had been given to the region; and within the present N. C., persons from Va. had settled what became the nucleus of the future state, on Albemarle

river. Sir William Berkeley, of Va., was one of the 8 proprietors of Carolina, and under a royal commission 1663, Sep., he appointed William Drummond first gov. to the settlement n.e. of the Albemarle. In 1667 John Locke prepared the elaborate paper constitution, which after alterations 1670 and 82, and far more sweeping changes 1698, was abandoned altogether, the colonists having practically disregarded it, while the proprietors kept up hardly more than an empty show of authority in the n. part of Carolina, which from about 1690 grew to be distinguished as N. C. instead of 'Albemarle,' its earliest name. Colonists had come, French Huguenots, German Lutherans, and Swiss, who founded New Berne. The pop. (1674) was about 4,000, and the tobacco product 800,000 lbs. After Cary's rebellion, 1711, and a short but sharp war with the Tuscaroras and other Indians, 1711–13, a half-century of quiet growth followed. From 1729 the colony became a royal possession by purchase from the proprietors. Great numbers of North of Ireland, Scottish Highland, and Moravian emigrants settled within the limits of N. C. Its several sections were occupied chiefly as follows: English Quakers and Baptists in the n.e., Swiss and French on the c. coast, Scotch in the s. toward the coast, and Scotch-Irish farther w., Dutch in the w. centre, and Moravians in the n.w. The royal govt. was last recognized 1774, Mar., and the same year, Aug., a provincial congress chose delegates to the first continental congress. A second provincial congress, called 1775, Apr., met Aug., and organized a govt. for N. C. In May of the same year, a local movement gave celebrity to Mecklenburg (q.v.), for its early declaration of independence. At the opening of the revolution, early in 1776, the British under Gov. Tryon were defeated by N. C. militia; her men served north and south in the patriot army, lost heavily in the fall of Charleston, and during the later years of the war, when the theatre of conflict was in part within the state, contributed, at King's Mountain (1780) and at Guilford Court-house (1781), toward the successful contest with Cornwallis, which forced him upon Yorktown and brought his final defeat. The jealousy for local independence of the people of N. C. made her the latest, except R. I., of the old thirteen to adopt the constitution and become one of the states of the Union; but 1861 she was the last of the southern states to join the Confederacy, by the war for which her resources in men and supplies were severely drained, while the federal forces 1861 seized forts Hatteras and Clark; later captured Roanoke Island and New Berne; still later the region about Plymouth, Kingston, and Washington: and important battles were fought on her soil, at Averysborough, Bentonville, and in the taking of Fort Fisher. The earliest reconstruction of N. C. began with a convention 1865, Oct. 2, which took all the

proper steps for renewed state organization and action, except ratification of the 14th amendment to the constitution of the United States. Under military govt., pursuant to an act of cong. of 1867, Mar. 2, a registration of voters was conducted Aug.–Oct.; an election held and vote taken to call a convention, and delegates chosen, Nov. 19 and 20; the convention held 1868, Jan. 14, and constitution framed; vote of the people to ratify it taken Apr. 21–23, and a state govt. and representatives to congress elected, upon which an act of cong., June 25, authorized the recognition of the state on its ratification of the 14th amendment. The state legislature met July 1; duly ratified the amendment July 2; and July 11 a presidential proclamation completed the restoration of the state to its place in the Union.

The successive govs. with their terms of service have been: Richard Caswell 1777–79; Abner Nast 1779–81; Alexander Martin 1782–84; Richard Caswell 1784–87; Samuel Johnston 1787–89; Alexander Martin 1789–92; R. D. Spaight 1792–95; Samuel Ashe 1795–98; William R. Davie 1798–99; Benjamin Williams 1799–1802; James Turner 1802–05; Nathaniel Alexander 1805–07; Benjamin Williams 1807–8; David Stone 1808–10; Benjamin Smith 1810–11; William Hawkins, 1811–14; William Miller 1814–17; John Branch 1817–20; Jesse Franklin 1820–21; Gabriel Holmes 1821–24; H. G. Burton 1824–27; James Iredell 1827–28; John Owen 1828–30; Montfort Stokes 1830–32; David L. Swain 1832–35; R. D. Spaight 1835–37; Edward B. Dudley 1837–41; John M. Morehead 1841–45; William A. Graham 1845–49; Charles Manly 1849–51; David S. Reid 1851–55; Thomas Bragg 1855–59; John W. Ellis 1859–61; H. T. Clark (acting) 1861–2; Zebulon B. Vance 1862–65; W. W. Holden (provisional) 1865; Jonathan Worth 1865–68; W. W. Holden 1868–71 (removed by impeachment 1871, Mar.); Tod R. Caldwell 1871–74; Curtis H. Brogden 1874–76; Zebulon B. Vance 1877–80; Thomas J. Jarvis 1881–84; Alfred M. Scales 1885–88; D. G. Fowle 1889–91; T. M. Holt 1891–93; Julius Carr 1893–96; D. L. Russell 1897–1901; C. B. Aycock 1901-5; Robert B. Glenn 1905-9; W. W. Kitchin 1909-13.

Counties.—There are 97 counties, of which Robeson is the largest and New Hanover the smallest. Wake has the largest population and Graham the smallest. There are railroads in all the counties except seven.

Cities.—The principal towns are Wilmington, the chief seaport, 30 miles above the mouth of the Cape Fear, up to which vessels can come drawing 24 feet; Raleigh, the State capital, named in honor of Sir Walter Raleigh; Charlotte, Greensboro, Salisbury, Statesville, and Winston in the central part of the State; Asheville, Waynesville and Morganton in the west, and Fayetteville, Goldsboro, Washington, Elizabeth City, New Bern and Beaufort in the east, the last four being like Wilmington, seaport towns.

Colonies.—There is a growing stream of immigration from the North, which in some instances has taken the form of colonies, the most successful and prosperous of which is at Southern Pines in Moore County. This State has the smallest per cent of foreign population in the Union, and indeed irrespective of percentage the smallest foreign population of any State.

Population.—By the census of 1900 North Carolina had a population of 1,893,810; of which 1,263,603 were whites; 624,469 were negroes; 5,687 Indians and 51 Chinese. There were 938,677 males and 955,133 females. There were something more than two whites to every negro. The bulk of the negro population is in the eastern division and the southern half of the central division. There are very few negroes in the mountain country. Pop. (1910) 2,206,287.

NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS.—A technical industrial institution founded in 1889 at West Raleigh. It was the result of a movement that had been agitated for some years by a small but earnest and determined set of men who became convinced that the industrial growth of the state was being retarded by the lack of technically trained men to assist and guide this development. The college opened its doors to students in October, 1889, with only one building, very little equipment, and only five professors present for duty. Since then, nine other large and comfortable buildings have been added, and the shops, the drawing-rooms, the chemical, the physical, the horticultural, the electrical laboratories, the barn, the dairy, and all the class rooms have been equipped with the best modern apparatus to do thorough and practical work. The specific object of the college is to give young men, besides a general education, a technical training that will make them self-sustaining in life, and intelligent directors of agricultural and mechanical enterprises. A regular course, minus the classical languages but plus scientific studies in particular lines, is offered at tuition fees so low as to attract young men from all parts of the State. Four years' courses are offered in agriculture, civil, mechanical, electrical, and chemical engineering, textile work, cotton manufacturing, and dyeing; the degrees conferred for the completion of these courses are bachelor of agriculture and bachelor of engineering; there are also graduate courses, two years' courses in agriculture, mechanic arts and cotton manufacturing, and twelve weeks' courses in agriculture, carpentry, machine shop work, engine and boiler tending, and machine drawing and designing. The experiment station is also connected with the college, and receives an annual Federal appropriation. The college controls the national land grant of 1862, and also receives State and Federal appropriations. The library contains 5,000 volumes; the students number 500, and the faculty 35.

NORTH CAROLINA, UNIVERSITY OF. The University of North Carolina is situated among the hills of Orange co. in the town of Chapel Hill, 500 ft. above the sea. The charter of the university was granted in 1789. The cornerstone of its first building, the Old East, was laid on 12 Oct., 1793, now known as University Day. Its endowment by the state was in the form of old claims on sheriffs and other public officers and escheats, including unclaimed land warrants, to be located in west Tennessee, granted to soldiers of the Continental Line. Only a small sum was realized from these sources for many years. The money which enabled the doors to be opened in January, 1795, was realized from donations in small amounts by friends of education and a loan of $10,000 by the State, afterward converted into a gift.

In 1877 the university was the first institution in the South to inaugurate a summer normal school. It was continued with much success, and has been one of the chief agents in arousing the spirit of education in the State.

The departments of the university have been increased until they now embrace a collegiate department leading to the degree of A.B., a graduate department giving the degrees of A.M., and PH.D., a law department having a two-years' course leading to B.L., a medical department giving two years at Chapel Hill and two years at Raleigh, with the degree of M.D., a pharmacy department with a two-years' course leading to PH.G., and a mining department.

Since its foundation the University of North Carolina has been a chief factor in the development especially of the southern states. From its walls have gone a national President (Polk), a Vice-President (King), heads of departments (Branch, Eaton, Graham, Dobbin, Thompson), a solicitor-general (Phillips), a president of the senate (Mangum), foreign ministers (Miller, Saunders, Barringer, Rencher), and many senators and representatives of the Union, while its alumni have as governors, judges, legislators, preachers, teachers and in corporate and individual private enterprises largely aided in molding our institutions and pushing onward our civilization.

NORTH CONWAY, *kŏn'wā:* village and summer resort in Conway tp., Carroll co., N. H. It is in the s.e. portion of the famous White Mountain region; on the Saco river; on the Portland and Ogdensburg, and the Eastern division of the Boston and Maine railroads; 138 m. n. of Boston. Its site is elevated, overlooking the valley of the Saco and commanding fine views of the mountains. Picturesqueness and healthful air have made the place a favorite summer resort. The Artist's Falls, Echo Lake, Cathedral, and other points of interest are near.

NORTH DAKOTA, *da-kō'ta:* state; one of the United States of America; 39th in order of admission into the Union, 26th under the federal constitution; created a state from the part of the terr. of Dakota n. of the 7th standard parallel; admitted by presidential proclamation 1889, Nov. 2.

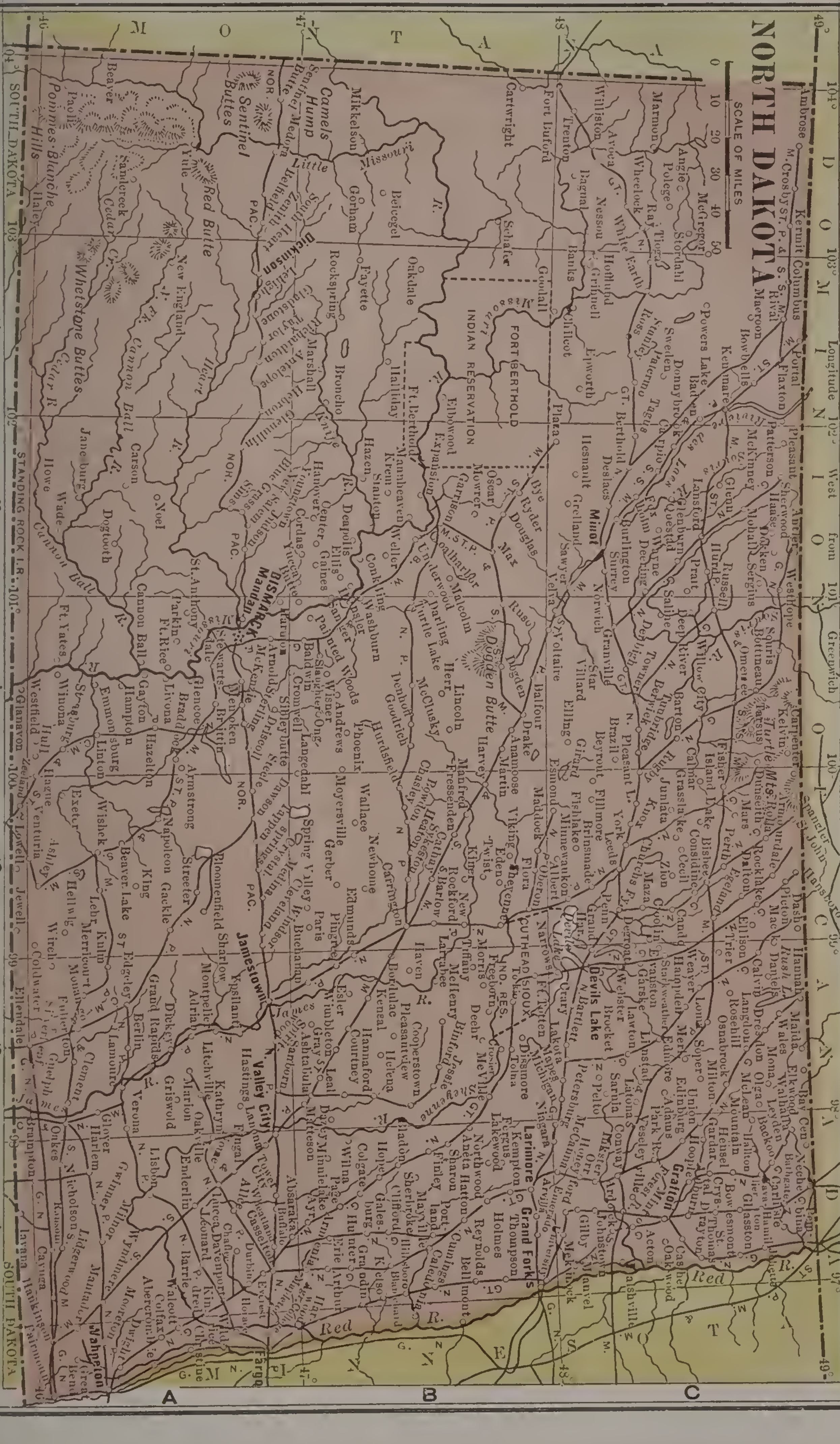
Location and Area.—N. D. is in lat. 46°—49° n., long. 96° 20′—104° w.; bounded n. by British America, e. by Minn., s. by S. D., w. by Mont.; extremebreadthn. to s. a little more than 210 m., extreme length e. to w. 360 m.; 74,312 sq. m. (47,569,680 acres); cap. Bismarck.

Topography.—The state is almost entirely an undulating prairie, with no prominences of note; and is divided naturally into the Red river and James river valleys, the Devil's Lake and Turtle Mountain regions, and the Mouse river, Missouri slope or coteau, and the w. Missouri or w. N. D. countries. The valley of the Red river of the north is a broad plain 50 to 60 m. wide, sufficiently high above the river to prevent overflows and to afford thorough drainage. It is, agriculturally, the garden spot of the n.w. country; is now well supplied with railroads; contains more than one-third the population of the state (1900); and has only one-fifth of its area under cultivation or other improvement. The Red river is navigable from Fargo to Winnipeg, empties into Lake Winnipeg, and ultimately discharges its waters into Hudson's Bay, through Nelson river. The valley has a deep, dark, mold soil, and between it and the Bad Lands on the w. is an equally fertile prairie country more than 300 m. broad. The James river valley contains some of the most prosperous counties in the state, and is one of the most noted artesian-well regions in the world. All forage and root crops do well here, and the stock-raising interests are steadily expanding. The seeding season usually begins Apr. 10, the breaking season June 1, hay harvest July 15, and barley, oat, and wheat harvest Aug. 10. The Devil's Lake and Turtle Mountain regions contain a beautiful inland sea, with heavy belts of valuable forest, and a range of hills extending into Manitoba, with their highest points, Bear Butte and Butte St. Paul, this side the boundary of Brit. America. These regions abound in coal, building-stone, timber, farming-lands, numerous streams, and are supplied with branch railroads; and iron ore is believed to exist in paying quantities. The wheat which took the premium at the New Orleans World's Fair was raised on the s. slope of Turtle Mountain, at Bottineau. The Mouse river rises in the Northwest Terr., enters N. D. in Renville co., follows an oxbow course through Ward, Stevens, McHenry, Bottineau, and Wynn counties, enters Manitoba, and, uniting with the Assiniboine river, discharges into the Red river of the north. Its valley is heavily timbered, and is 200 to 300 ft. below the level of the surrounding plains. Sheep and cattle raising are the chief industries of this region. A tributary of Mouse river, Des Lacs river, has

A B C

Area in Square Miles, 70,795. Population, 319,146.

Number of Counties, 43. Capital of State, Bismarck.



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a valley 75 m. long, with an abundance of coal and wood. The Missouri slope or coteau country is w. of the divide between the James and the Missouri rivers, and comprises natural meadows, lake lands, knolls, rolling hills, and sloping vales. It is particularly rich in native grasses; is adapted to horse, cattle, sheep, and hog raising, as well as to cereal and root crops; and is noted especially for the abundance and variety of its wild roses. The w. N. D. tract, often misleadingly called the w. Missouri country, differs materially from the e. portion of the state; has widely separated hills and broad valleys, with numerous buttes; is watered by the Heart, Knife, Cannon Ball, Green, Sweetbriar, Curlew, and Little Missouri, and other rivers; and has earlier seasons and less snow than the same latitude e. of the James river. Coal, and mineral and vegetable deposits, are abundant. The Missouri river enters N. D. in Allred co., lat. 48° n., flows e. and s., and passes into S. D. at the junction of Emmons, Campbell, and Bozeman counties, about the centre of the s. boundary of N. D. Nearly midway between it and the Red river is the James (formerly Dakota) river, which flows in a generally s. direction from Wells co., and through N. D. and S. D., to the Missouri river at Yankton. The Red river of the north, in whose valley are the great wheat farms of Manitoba, Minn., and N. D., forms the entire e. boundary of North Dakota.

Geology.—The principal mineral resource of the state is lignite or brown coal, the measures of which extend beneath the whole country w. of the Missouri river, and for a considerable distance e. of that river. Mining is carried on in Morton, Stark, Hettinger, McLean, Emmons, and Wells counties, and in several other counties w. of the Missouri and Mouse rivers; and in many places the croppings are so exposed that the settlers mine their own fuel with pick and shovel. Salt, limestone, and hydraulic lime are abundant in the Red river region; natural gas has been developed at Blunt, Fargo, and Jamestown; excellent cream-colored bricks are made at Dickinson, Stark co.; and clays for brick-making and pottery are found in many places. The valley of the Red river shows glacial drift beneath lake mud; and the country between it and the Bad Lands gives evidence, in railroad cuttings, of the action of large bodies of water, modifying the drift, sorting it into stratified beds of sand and gravel, and depositing sediment similar to the loess of Iowa and Missouri.

Climate.—The general elevation of the state, 1,000 to 2,500 ft. above sea-level, insures a clear atmosphere and immunity from malarial and pulmonary disorders. In winter the weather is cold, and the air dry and invigorating; there is no rain; snow lies crisp and hard under foot; heavy storms are less frequent than in O. or N. Y.; blizzards rarely occur; and the season breaks in March. In summer the weather is warm by day and cool at night. Autumn is a delightful season, usually

permitting plowing till the middle of Nov., and extending far into Dec. The mean annual temperature, shown by records in the U. S. signal offices at four of the most widely separated stations, is—Pembina 34.4°, Fargo 37°, Bismarck, 39.4°, Fort Buford 38.7°; and the annual rainfall—Pembina 21.91 in., Fargo 27.17, Bismarck 20.10, Fort Buford 13.91: and the snowfall ranges from $5\frac{1}{2}$ to $7\frac{3}{4}$ inches.

Agriculture.—The soil is by far the richest in the Red river valley, a wonderful bottom land, where the black rich top soil of decayed vegetation overlies alluvium and glacial drift to the depth of sometimes 300 ft., down to a clay which when near the surface is itself rich farming land. The great crop of N. D. is wheat, which commands splendid prices. Other immense crops are oats, barley, and corn. The flaxseed crop is easily the largest in the U. S., while potatoes are also valuable. Garden produce is extensive, while small fruits and grasses grow in abundance. Orchard fruits, however, are not much cultivated. The export of hay is important, and the wool clip very valuable.

Manufactures.—There are nearly 1,500 manufacturies, whose annual product aggregates about $10,500,000. The State being pre-eminently an agricultural and stock-raising one, the only considerable manufactures which are not "neighborhood" ones are those of flour, potteries, and brick. Good returns are realized, however, from harnesses and saddlery, dairy products, fur and woolen goods, wire work, carriages and wagons, soda and mineral waters, paper and tow, car-shop work, lumber and timber products, tobacco, cement, and binding twine.

Finances and Banking.—The total assessed valuation of property, including both personal and realty, is $278,594,193, the tax rate of $4.40 per $1,000, and the bonded debt $1,151,300. There are over 40 national banks, over 150 State banks, and building and loan associations with large memberships.

Transportation.—The Missouri is navigable throughout its length in the state and the Red River from Fargo to the end, although boats ordinarily run only from Grand Forks. Several important lines of railroad traverse the state, there being altogether a total trackage of approximately 4,000 miles.

Education.—The state spends about $3,000,000 a year in the maintenance of its public schools, in which there are about 130,000 pupils enrolled, with about 6,500 teachers. The institutions for higher education include an agricultural college at Fargo, largely supported by Congress; a State University at Grand Forks, with a school of mines connected therewith; a State normal school at Valley City and another at Mayville; a school of forestry at Bottineau; and a scientific school at Wahpeton, all provided for by the constitution and possessing extensive land grants. There are about 100

traveling libraries in use in the system. The newspapers and periodicals published within the State number about 250. The schools are managed by a board of commissioners, composed of the governor, the superintendent of public instruction, and the president of the State University. The public schools of the state have a land endowment, the value of which is estimated at approximately $50,000,000.

Charities and Corrections.—The charitable and corrective institutions in the State include a State insane hospital at Jamestown; an asylum for the blind at Bathgate; an institution for the feeble-minded at Grafton; a deaf and dumb institute at Devil's Lake; a soldiers' home at Lisbon; an industrial school and school of manual training at Ellendale; a State penitentiary at Bismarck; and a state reform school at Nandan.

State Government and Finances.—The governor is elected for two years, and receives $3,000 a year. He has a veto by items. The state officers are elected in November of the even-numbered years. The legislature is composed of a senate to consist of 30 to 50, and a house of representatives to consist of 50 to 140; it now has 103. It meets biennially in January of the odd-numbered years, and the sessions are limited to 60 days. The supreme court has three justices, a chief and two associates; when the state has 600,000 people it may increase the number to five. Women may vote for school offices, and may hold them. Under the new apportionment of the census, the state sends two representatives to congress. It has been heavily Republican since its admission, except in 1892, when the Democratic-Populist fusion barely carried it; it is so at present by nearly two to one. The Democratic platform (1896) especially favored adequate taxation of corporations, and denounced 'government by injunction.' The state constitution makes it a misdemeanor for any one to interfere with another's obtaining, or enjoying after having obtained, employment from any one. It also provides for the prohibition of the liquor traffic. The assessed valuation of the state for 1903 was $133,880,414. The state, by its constitution, is limited to a 4-mill tax, but the interest on the bonded debt, school tax, etc., raises it to 7.2. The balance in the treasury on 1 Jan., 1903, was $670,409.35; the bonded debt was $682,300. The income during 1902 was $2,125,232.24. A permanent sinking fund was established during the year; the interest-bearing warrants for current expenses, which had been much overdue and shunned by investors, were taken up, and the finances of the state put on a sound footing.

The new state govt. was organized by the election of John Miller, republican, gov., and of a legislature of 31 senators and 63 representatives, having a republican majority of 19 in the senate and 46 in the house.

The first legislature elected Gilbert A. Pierce and Lyman R. Casey, republicans, U. S. senators; and

Henry C. Hansbrough, republican, was elected representative-at-large in congress. The first judges of the supreme court of the state were Guy C. H. Corliss, chief-justice, and Joseph M. Bartholomew and Alfred Wallin, associate justices; and the first judges of the district courts were Charles F. Templeton, D. E. Morgan, William B. McConnell, W. S. Lauder, Roderick Rose, and Walter H. Winchester. The first U. S. district atty. was John Murphey; first U. S. marshal, D. W. Maratta; first pres. of the state senate, Lieut. gov. Alfred Dickey; first speaker of the house, David B. Wellman. N. D. has 39 counties.

Population and Civil Divisions.—In 1880 the population of this section of what was then Dakota Territory was 36,305, excluding Indians; in 1890, it was 174,545, or 182,719 altogether; in 1900, 319,146 altogether; the government estimate for June, 1903, is about 360,000, but the rapid development of coal mining and recent heavy emigration to the state may have raised it beyond that figure. Of this total, 311,712 were white, 286 colored, 6,968 Indians, and 180 Chinese and Japanese. The foreign-born were 113,091; but as of these 25,004 were Canadian English, 2,909 English from England, 1,800 came from Scotland, and 2,670 from Ireland, of whom probably a third, or 800 to 900, were English and Scotch from the North; there were not over 70,708 of really alien blood. Of this mass, more than half were Scandinavians,—30,206 Norwegians, 8,419 Swedes, and 3,953 Danes; 14,979 Russians; 12,677 Germans from Germany and Austria; 3,162 French Canadians; 2,670 from Ireland altogether; 1,445 Bohemians; 700 Italians, and 353 Rumanians (Jews, as were nearly all the nominal Russians. Pop. (1910) 557,056.

Cities and Towns.—The two chief places of the state are Fargo and Grand Forks, both on the Red River of the North, at the crossing respectively of the Northern Pacific and the Great Northern railroads. Fargo had 14,331 in 1910, having nearly tripled since 1890; Grand Forks had 7,652 in 1890, and 12,478 in 1910. The other towns of importance are Bismarck, the capital 5,443, on the Missouri; Jamestown on the Dakota (James) river, and the N. P., 2,853; Valley City on the Sheyenne at the crossing of the N. P. and the M., St. P. & S. Ste. M., 2,446; Grafton on the Park west of Red river in the north, 2,378; Wahpeton on the Red river in the south, 2,228; Dickinson on the Heart river in the southwest, on the Northern Pacific, 2,076, and Minot in the northwest. The Indians are nearly all on four reservations: Standing Rock, on the Missouri in the southern centre; Fort Berthold, around the junction of the Little with the main Missouri; Devil's Lake, and Turtle Mountain. There are also several military posts; the largest is to be Fort Lincoln near Bismarck, and contain 62 buildings.

History.—The terr. of Dak. was named after a family of Indian tribes, and was part of the La. tract bought

by the United States from France 1803. The first national improvement of the section was the organization of Minn. Terr. 1849. A second part was appropriated to Neb. Terr. 1854, and from this part Dak. Terr. was organized 1861, extending from Minn. to the Rocky Mts., and from lat. 42° 28′ to 49° n. Two years later, all the portion of Dak. w. of long. 27° was utilized in forming Idaho Territory. In 1864 Montana was organized out of the n. part of e. Idaho, and Dak. was given the s. tract, comprising over 91,000 sq. m.; but it held the large increase of territory only four years, because the act of congress authorizing the formation of Wyo. Terr. provided that it should be given all but 2,000 sq. m. of the tract transferred to Dak. 1864. The cap. of Dak. was established at Yankton, where the first legislature assembled 1862, Mar. 17; in 1883 the cap. was transferred to Bismarck. Though a few settlements by the whites were made 1859, emigration to Dak. was checked by the Indian wars 1862–3, and subsequent isolated uprisings, and in 1870 the pop. aggregated only 14,181. The discovery of gold and silver in the Black Hills led to an early settlement of that region; but the great prairie lands of the n. did not attract capital and agricultural skill till 1875. A number of capitalists, large holders of the bonds of the Northern Pacific railroad (taken at par, but then worth only 10 cents on the dollar), determined to save as much as possible, and exchanged these bonds for a great block of the company's lands. 1875, Mar., Oliver Dalrymple, an experienced farmer of Minn., examined this treeless expanse, became convinced of its extreme value for wheat-growing, and made a contract with the owners to test the merits of the soil. He plowed 1,280 acres, and his first harvest (1876) yielded 32,000 bushels of the choicest grain. As soon as the results of this experiment became known, capital began seeking the depreciated railroad bonds and exchanging them for land, and labor flocked from adjoining states to preëmpt govt. land. In 1879, May, June, and July, the sales of govt. land amounted to nearly 700,000 acres, and during that year 1,500,000 acres were taken on homestead, preëmption, and tree claims. Mr. Dalrymple's success soon led to the laying out of the Grondin, Alton, Cass, Cheeney, and Smith-Dodge farms, nearly equalling the Dalrymple in size, and managed on the same comprehensive scale.

The 1880 census showed that the terr. had the requisite number of permanent inhabitants for its admission into the Union as a state; and an agitation for statehood soon began. The first important movement was 1882, Jan. 5, when a convention was held at Fargo, in which every co., excepting two in N. D., had representatives. Resolutions were adopted expressing the sentiment of the delegates—*first*, that the terr. should be immediately divided, the 46th parallel of lat. being suggested as a natural dividing-line: and, *secondly*, that the s.e. portion should be erected into a state. It was

afterward voted expedient to have two territories and one state organized from the existing domain, the n. portion to be known as the terr. of Pembina, and the s. as the terr. of Lincoln. In the mean time, bills had been introduced into congress providing for the admission of a portion of the terr., and had been referred to the proper committees. In Feb., the house committee on territories reported a bill providing for the admission as a state, under the name of the State of Dakota, of the portion included within these boundaries: beginning at a point on the w. line of the state of Minn., where the 46th parallel of n. lat. intersects the same; thence s. along the w. boundary-lines of the states of Minn. and Io., to the point of intersection with the n. boundary-line of the state of Neb.; thence w. along the n. boundary-line of Neb., to the 27th parallel of w. long.; thence n., to the 46th parallel n. lat.; and thence e., to the place of beginning. The e. part of the s. half of the terr. was designated as the area of the proposed state. No decisive action was taken on this bill. During the winter 1881–2, the territorial legislature enacted a law providing for a constitutional convention, to frame a constitution and state govt. for the whole tract s. of the 46th parallel; but the gov. neither signed nor returned the bill. A convention was then publicly called to consider the question, and, in accordance with its recommendation, a convention was held 1883, Sep. 4–9, at Sioux Falls, which framed a constitution, and assigned to the new state that part only of the s. half lying e. of the 27th parallel w. long. Sep. 12, delegates from the n. section met in convention at Fargo, and protested against the action of the Sioux Falls body; but at the election in Nov. the constitution was ratified by a majority of 5,552. In 1884, Dec., a bill providing for the erection of the s. half into a state, under the name Dakota, and the continuance of the n. half as a terr., under the name Lincoln, passed the U. S. senate, but reached no decision in the house. The question as to whether it would be best to have the terr. admitted into the Union as two states or as one was submitted to popular vote 1887, Nov., and a majority of the voters, favored a decision on the 7th standard parallel or the 46th parallel of lat. In 1889, Feb., congress passed an enabling act, providing for the assembling of conventions in the two sections of Dak., which should prepare constitutions for the proposed states, and appoint a joint committee to agree upon a division of the institutions, debts, records, etc., of the terr., which agreement should be incorporated in the constitution of each proposed state. These conventions were held July, at Bismarck and Sioux Falls; the proposed constitutions were ratified by the citizens Oct.; and Nov. 2, 1889, Pres. Harrison issued a proclamation declaring N. D. and S. D. to be states in the Union.

STATE UNIVERSITY OF NORTH DAKOTA.

Prior to this date, Dak. had the govt. provided by congress for all the territories, except that, on account of its large area, it alone of all the territories had six justices of the supreme court, appointed by the president. The following is a list of terr. governors, with the terms for which they were appointed: William Jayne 1861–63; Newton Edmonds 1863–66; Andrew J. Faulk 1866–69; John A. Burbank 1869–73; John L. Pennington 1873–78; William A. Howard 1878–80; Nehemiah G. Ordway 1880–84; Gilbert A. Pierce 1884–86; and Louis K. Church 1886-90. The present governor is John Burke, 1907—.

NORTH DAKOTA AGRICULTURAL COLLEGE, opened in 1891, at Fargo. The regular four years' courses include agriculture, general science, and mechanical engineering; the shorter courses are agriculture and steam engineering, two years, and a "farm school" of three months; there are also courses in domestic science and military science. The college is open to women, and there are women on the faculty. The campus includes 640 acres; a new sewerage system connecting all buildings and grounds with the main sewer of Fargo was completed in 1901. The income, is derived mainly from State and Federal appropriations. The college organizes farmers' institutes in all parts of the State, under the supervision of the faculty; in 1901 18 such institutes were held, with an attendance of over 7,000. The faculty in 1901 numbered 26, and the students 604.

NORTH DAKOTA, STATE UNIVERSITY OF. The State University and School of Mines of North Dakota is located at Grand Forks. It was established by an act of the Territorial Legislature approved 27 Feb. 1883. The following colleges or departments have thus far been organized: The College of Law, granting the degree of LL.B.; The College of Liberal Arts, granting the degrees of B. A. and M. A.; The College of Mechanical and Electrical Engineering, granting the degrees of M. E. and E. E.; The College of Mining Engineering, granting the degree of E. M.; the Normal College; the School of Commerce; and the School of Pharmacy. The plant of the University consists of eight substantial buildings heated by steam and lighted by electricity. The University has received as a grant from the Federal Government 126,080 acres of land which, under the terms of the grant and of the state constitution, may not be sold for less than $10 an acre. It is probable that this grant will eventually yield a fund of not less than $2,000,000. The University is maintained by an annual fixed appropriation of two-fifths of a mill on the dollar of the assessed valuation of the State for purposes of taxation. The University owns, exclusive of its lands, property valued at $500,000. Its library numbers 30,000 volumes.

NORTHEAST AND NORTHWEST PASSAGES: navigable passages from Europe to eastern Asia—around the n. coast of Europe and Asia, or around the n. coast of N. America. The numerous and important discoveries made by the Portuguese and Spaniards in the southern latitudes of Asia, from about the beginning of the 16th c., and the reports which, on their return, they spread of the fabulous wealth of those regions, excited the other maritime nations of Europe to send out expeditions to the E. Indies for obtaining a share in the lucrative traffic till then monopolized by Spain. But Spain, then at the height of her prosperity, was not disposed to admit other nations to share her good fortune, and dealt so summarily with all intruders, having at that time the complete command of the Atlantic and Indian oceans, that her rivals were reluctantly compelled to abandon all trading in those seas. Unwilling, however, to lay aside their designs of opening a trade with the far-famed India and Cathay (as China was then called), they resolved to attempt to reach those regions by some other route. Two plans appeared feasible—one, to reach e. Asia by coasting along the n. of Europe and Asia, the *North-East Passage;* the other, by sailing w. across the Atlantic. The latter was attempted first by John Cabot 1497; but he found his progress barred by the American continent, or, at least, those parts of it known as Newfoundland and Labrador. Three years afterward, Gaspar de Corterea' and his brother made three several voyages in the same direction; and on reaching Newfoundland sailed n., but were stopped on the coast of Labrador, lat. 60° n.: both afterward perished, with all their followers. Several voyages were soon afterward made to discover if a passage for ships existed to the n. of America (the *North west Passage*), but without success; and the hardships which navigators were subjected to, in these inhospitable climes, caused the abandonment for the time of all further investigations in that direction.

Northeast Passage.—The search for a N. E. Passage was then vigorously prosecuted, England sending out the first expedition for this purpose 1553. It consisted of three ships, commanded by Sir Hugh Willoughby, and was fitted out under direction of the celebrated Sebastian Cabot; but on rounding the North Cape, one of the ships was separated from the others during a violent storm, and subsequently entered the White Sea, then unknown to western Europeans. The other two, under Willoughby, drifted hither and thither in the vast waste of water surrounding the pole, till the navigators sighted Nova Zembla. Being unable to land, they sailed back along the n. coast of Russia, and took up their winter quarters on the coast of Russian Lapland, where they were subsequently found frozen to death. Several other expeditions were, at different times, sent out by the English and Dutch, but none of them ever succeeded in penetrating further than the e. coast of Nova Zembla, though they rendered good service to geography by

making accurate surveys of n. Europe and the adjacent islands of Spitzbergen, Nova Zembla, Waygatz, etc. It was long believed that the promontory which is the e. boundary of the Gulf of Ob was the *Tabis* of Pliny, and formed the n.e. corner of Asia; and this opinion, which received the assent of the famous Gerardus Mercator, tended greatly to encourage renewed explorations, as, according to it, the e. coast of Asia was not more than 400 m. from Nova Zembla. The following is a list of the chief expeditions for the discovery of the N. E. Passage:

Willoughby and Chancellor,	English,	1553
Burroughs,	"	1556
Pet and Jackman,	"	1580
Barentz, William (three expeditions),	Dutch,	1594–1596
Hudson, Henry, first expedition,	English,	1608
Hudson, Henry, second expedition,	Dutch,	1609
Wood,	"	1676

In his third expedition, Barentz nearly reached Icy Cape, about long. 100° e., but was, with his crew, imprisoned by the ice, and died before the return of spring. Various important discoveries were made during this expedition, which proved that in favorable seasons a passage could be found to the eastward; but after the subsequent failures of Hudson and Wood, the attempt was abandoned in despair. The Russian govt. now took up the search, and, both by overland expeditions and by vessels starting from various points on the n. and e. coasts of Siberia, sought to discover a practicable passage. The chief of these expeditions were those of Behring 1741, which started from Petropaulovski, and was stopped at the East Cape; of Shalaroff; and of Billings. In 1875 and 6, Prof. Nordenskjöld reached the e. shores of the Gulf of Ob; and in July, 1878, a well-equipped Swedish expedition, under the same veteran explorer, attempted once more the N. E. Passage. The party successfully rounded Cape Severo or Tchelyuskin, the most northerly portion of the old world (in lat. 77° 41′ n.), and had nearly reached Behring's Strait when, Sep. 25, they were frozen in. Released 1879, July, they accomplished the passage without loss, and arrived at Yokohama Sep. 2. During the voyage and their winter of seclusion, they were indefatigable in scientific observation and research.

Northwest Passage.—Sebastian Cabot and the brothers Cortereal having failed in their attempts to round the n. coast of America, it was not till after several unsuccessful attempts had been made to find a N. E. Passage that investigations of the n. coast of America were resumed. As these investigations were carried on till within the last few years solely by the English, their prosecution till a definite result was arrived at came to be viewed as a point of national honor; and repeated expeditions were sent out long after it had been clearly shown that a N. W. Passage, when found, would be useless in a mercantile view. In all, more than 20 voyages were made in

search of the N. W. Passage, so that only the most important of them can here be mentioned. The first expedition, after that of Cabot, was sent out 1576, under Martin Frobisher, who made a second and third voyage in the two following years, but without any important discovery. 1585–88, northern enterprise received an impetus from the successful expeditions of Capt. John Davis. This navigator sailed up the strait which bears his name, as far as lat. 72° n., and reported open sea still further n.; he then surveyed the e. and w. sides of the strait, but without further important results. Henry Hudson (q.v.), who had previously attempted the N. E. Passage, followed in 1610, and discovered Hudson Strait and Bay, believing the latter to be an inlet of the Pacific Ocean, an opinion which was proved erroneous by the investigations of Button in 1612; the latter, however, on his return, put forth the equally erroneous opinion that the bay was closed in on all sides, except the two e. entrances. Button's account was not universally credited, and accordingly, 1615, Capt. Bylot, who had been one of Hudson's company, was sent out, accompanied by Baffin, the most skilful navigator and scientific observer of the time; but their first expedition, which was to Hudson's Bay, was without result. In their next voyage (1616), they sailed up Davis' Strait, reaching lat. 78° n.; and satisfying themselves by a very superficial investigation that there was no n. outlet, the bay (as it was then believed to be) was named in honor of its explorer, Baffin's Bay. On their return southward, they coasted along the w. side, and discovered an opening to the w. which they named Lancaster Sound, but, believing it to be only an inlet, did not explore further. On his return, Baffin gave it as his decided opinion that no outlet to the w. existed from Baffin's Bay; and the attention of explorers was again directed to discover an outlet from Hudson's Bay. In 1619, the solitary attempt by other nations to aid in the search was undertaken by Jens Munk, a Dane, but he made no discoveries. The expedition of Fox and James, 1631, led to partial exploration of the channel since known as Fox Channel, the n. outlet to Hudson's Bay; and from that time the spirit of discovery slumbered till 1741. Between 1741 and 46, several expeditions were sent out to discover an outlet from the n.w. corner of Hudson's Bay, but their united researches satisfactorily proved that no such outlet existed. Owing to these disappointments, the search for a N. W. Passage was discontinued for more than half a century, notwithstanding the Brit. parliament had promised a reward of £20,000 to the fortunate discoverer. In 1818, the admiralty took up the search, and sent out Capt. John Ross and Lieut. Parry, who sailed up Davis' Strait, and ascended Lancaster Sound 30 m.; here Capt. Ross gave up the search, considering it to be hopeless. But this opinion was not agreed in by Parry, who was accordingly sent out in the following year, and succeeded in far outstripping all his predecessors in northern

discovery. He entered Lancaster Sound July 30, and a few days afterward discovered a large inlet, 30 m. broad, which he named Prince Regent Inlet. After exploring this inlet some distance, he returned, and continued his course westward, as the ice allowed him, passing through a strait which he named after Sir John Barrow, the promoter of the expedition. Continuing westward, he reached long. 110° w., in Melville Sound, where he was stopped by the ice; and after wintering here, and giving names to the numerous islands, seas, and straits that he had discovered, returned to Britain, with the glory of having advanced 30° of longitude further w. than any previous explorer. On his arrival, he was welcomed with immense enthusiasm, and his discoveries imparted renewed energy to the half-dormant maritime enterprise of the British. There was now no doubt in what direction the N. W. Passage was to be sought, but Parry's second expedition (1821–23) was for the purpose of determining whether the Fox Channel was connected with the Arctic Sea of his previous voyage; it was, however, unsuccessful. A little before this time, the coast-line of N. America from Behring's Strait to Point Turnagain, long. 109° w., had been fully traced, so that it remained only to find some navigable passage from Regent Inlet to this point, and the long-wished-for result would be attained. For this purpose, Capt. John Ross was sent out with an expedition 1829, and, after a laborious and difficult voyage up Prince Regent Inlet, reached a point only 200 m. from Point Turnagain. It was during this voyage that he discovered the magnetic pole. Dease and Simpson, 1838, extended the survey of the Amer. coast from Point Turnagain to within 90 m. of the magnetic pole; but the hopes of a channel between these points were dashed by the discovery made by Dr. John Rae, 1847, that Boothia (the land which bounds Regent Inlet on the w.) is a peninsula of the American continent. The unfortunate expedition of Sir John Franklin, it had been hoped, would settle the question of a N. W. Passage. It sailed from England 1845, May 19; and was seen last in Baffin's Bay. Franklin is believed to have sailed through Lancaster Sound, and ascended Wellington Channel to lat. 77° n., and thence returned southward, crossing Barrow Strait, and sailing down the channel (now called Franklin Channel) which separates n. Somerset and Boothia Felix from Prince of Wales Island, to the w., where, lat. 70° n., long. 98° 30′ w., his ships were beset with ice 1846, Sep. 12; and Franklin died 1847, June 11. The survivors abandoned the vessels 20 m. s.w. of this point, and perished in the attempt to reach the Amer. mainland. Many expeditions were sent out to search for the missing voyagers. One of these, under Collinson and M'Clure, sailed from Plymouth 1850, Jan. 20, and reached Behring's Strait in Aug. Sailing e. the following spring, M'Clure's ship became fixed in the ice, about 60 m. w. of Barrow Strait, and the crew were found by Sir Edward Belcher, sent to

their assistance 1852. Belcher, who had reached Melville Sound by the e. passage through Lancaster Sound, returned the same way: thus M'Clure and his company were the only ship's crew who had ever penetrated from Behring's Strait to Baffin's Bay. Lieut. Schwatka, U.S.N., led a party 1879-80, who accomplished a sleigh journey of 3,250 m., and proved that Franklin was really the discoverer of the N. W. Passage, and brought back relics of Franklin's expedition, including the bones of Lieut. Irving of the *Terror*. By the various English and American Franklin expeditions, the whole region n. of the Amer. mainland, as far as lat. 77° n. and long. 106° w., has been thoroughly explored, and various channels of communication between Davis's and Behring's straits have been discovered—but all practically useless from a commercial standpoint. In 1905, Capt. Roand Amundsen of Norway, was the first navigator to traverse completely the NORTHWEST PASSAGE. With a crew of 7 men, in the ship *Gjoa*, he left Christiania 1903, June 17, proceeded to Baffin Bay, then through Lancaster Sound, Barrow Strait, Peel Sound, James Ross, Rae, Simpson, Dease, Coronation Gulf, and Dolphin and Union straits to King Point in Mackenzie Bay on the mainland 50 m. s.e. of Herschel Island, where he met the San Francisco fleet of whalers, 1905, Aug. 26. Leaving his ship in winter quarters, Capt. Amundsen left Herschel Island, Oct. 24, and travelling 700 m. overland with dog-sleds, reached Fort Egbert, Eagle City, Alaska, Dec. 5. Among work of scientific value accomplished by the expedition, King William Land was surveyed in the Spring of 1905 to 72° 10′ n., and the variable north magnetic pole was located within 90′ of lat. 68° 30′ n. and long. 97° w. See also POLAR EXPEDITIONS.

NORTHEAST BOUNDARY DISPUTE: the disagreement between the United States and Great Britain from 1783 to 1842 respecting the northeast frontier. The Treaty of 1783 defined the northeast boundary of the United States, toward Canada, as extending from the source of the St. Croix due north to the highlands or watershed between the Atlantic and St. Lawrence systems, thence along those highlands to the northwesternmost head of the Connecticut River. Disputes arising over this definition, in 1831 the King of the Netherlands, as arbitrator, made an award which neither party was willing to accept. Finally, by the Webster-Ashburton Treaty of 1842, the present line was agreed upon, not greatly differing from that suggested by the Dutch king, and giving about seven-twelfths of the disputed territory to the United States and about five-twelfths to Great Britain. See BOUNDARIES OF THE UNITED STATES, DISPUTES AND SETTLEMENTS.

NORTHEN, *nōr'tĕn*, ADOLPH: German painter: b. Münden, Prussia, 1828, Nov. 6; d. Düsseldorf 1876, May 28. He was a pupil in the Düsseldorf Academy from 1847 to 1851, when he devoted himself to the delineation

of soldier life and battle scenes. In 1852 he began a series of pictures illustrating the wars of Napoleon I. These included *The Battle of Belle Alliance* (1860); and *The Retreat of the Grand Army.* To these he added scenes from the war with Denmark, and from the German-Austrian war 1866. His series portraying the last Franco-Prussian war includes *The Storming of Weinberg; The Transport of Freneh Prisoners;* and *The Charge of the 16th Uhlans on a Square.*

NORTHERN BEAR: in international politics, a name often applied to Russia.

NORTHERN DRIFT: in geology, an obsolete name for the boulder-clay of the Pleistocene Period. The deposits were popularly supposed to have been brought by the polar currents from the far North.

NORTHERN GIANT: a name frequently applied in Europe to Russia, alluding to its size, growth, and population.

NORTHERN LIGHTS. See Aurora Borealis.

NORTHERN MYTHOLOGY. See Mythology.

NORTHERN TERRITORY. See South Australia.

NORTH'FIELD: Mass., town in Franklin County; on the Central Vermont railroad; about 12 miles northeast of Greenfield and 30 miles northwest of Fitchburg. It is famous as a centre of religious training. It is the birthplace of Dwight L. Moody (q.v.) and was his home and the scene of much of his work. The annual conferences of Christian workers and of students are held, in summer, in Northfield. The town is the seat of the Northfield Training School and of the Northfield Seminary for young women. The Mount Hermon School for Boys, in the adjacent town of Gill, is connected with the Northfield educational work. The town is in an agricultural region and its industries are connected with farm products. The government is administered by town meetings. Pop. (1900) 1,966; (1910) 1,642.

NORTHFIELD: Minn., city in Rice County; on the Cannon River, and on the Chicago G. W. and the Chicago, M. & St. P. R.R.'s; about 40 miles south by west of Saint Paul. It was settled in 1856 and in 1875 was chartered as a city. It is in a fertile agricultural section in which wheat is one of the principal crops. The chief manufactures are knit goods, dairy products, flour, and brick. It has considerable trade in grains and live stock. It is the seat of Saint Olaf College, opened in 1875 under the auspices of the Lutheran Church, and of Carleton College, opened in 1870 by Congregationalists. Other educational institutions are the Scoville Library, the Goodsell Observatory, and the public schools. It has the Odd Fellows' Orphans' and Widows' Asylum, a Y. M. C. A. building, and several fine churches. The city owns and operates the waterworks. Pop. (est.) 3,500.

NORTHFIELD: Vt., village in Washington County; on the Dog River, and on the Central Vermont railroad; about nine miles south by west of Montpelier. It is in a valley surrounded by low hills and mountains. Bald and Paine mountains are near. In the vicinity are black slate and granite quarries. The chief industries are connected with the quarrying of granite and slate, and with farm and dairy products. It has flour and lumber mills and woolen factories. It is the seat of the Norwich University, opened in 1834. The village owns and operates the electric light plant. Pop. (1910) 3,226.

NORTH GERMAN CONFEDERATION. See GERMANY.

NORTH HOL'LAND CANAL: channel 50 m. long, 124 ft. broad at the water-level and 31 ft. at the bottom, of depth sufficient to allow the passage of vessels drawing 18 ft. It connects the city of Amsterdam and the Helder, and was constructed to avoid the difficulties, delays, and dangers to which the large merchant-vessels of modern times were subjected in reaching Amsterdam through the shallow, and in many places obstructed, channels of the Zuyder Zee. The details were planned by Herr Blanken, and the great work was completed 1825. On account of ice, the canal is not always available in winter, and it is not large enough for the passage of some of the ships now in use. It has been supplemented by the North Sea Canal (q.v.).

NORTHINGTON, *nôr'thĭng-ton*, ROBERT HENLEY, 1ST EARL OF: English statesman: b. about 1708; d. Grange, England, 1772, Jan. 14. He was educated at Oxford; in 1733 was called to the bar, and in 1747-57 sat in Parliament for Bath. In 1756 he was appointed attorney-general, and in the next year became lord keeper of the great seal and took his seat as speaker of the House of Lords over which he presided for three years. In 1761 he was made lord chancellor, and owing to ill-health resigned in 1767.

NORTH'MEN. See NORMANS.

NORTH PLATTE, *plăt:* Neb., city, county-seat of Lincoln County; at the confluence of the North and South Platte rivers, and on the Union Pacific railroad; about 220 miles in direct line west of Lincoln, the capital of the State. It is in a productive agricultural region where irrigation has been introduced, and in which there is a large acreage of alfalfa, sugar beets, corn, and wheat. Considerable attention is given to stock-raising. The railroad machine shops here employ several hundred men. It has grain elevators, a cold storage plant, stock yards, brick, coal, and lumber yards. It is the seat of a United States land office. The Y. M. C. A. library has about 2,200 volumes. Pop. 4,000.

NORTH POLE. See ARCTIC REGIONS; POLAR EXPEDITIONS.

NORTH RIVER: the name given to the lower course of the Hudson River. This name was applied in the early days when the Delaware was called the South River. See HUDSON RIVER.

NORTHROP, *nôr'thrŭp,* BIRDSEY GRANT: American educator and clergyman: b. Kent, Conn., 1817, July 18; d. Clinton, Conn., 1898, April 27. He was graduated at Yale in 1841; and from its divinity school in 1845; and was subsequently a pastor of a Congregational Church at Saxonsville, Mass., for 10 years. He was agent of the Massachusetts State Board of Education 1857-67 and secretary of the Board of Education of Connecticut 1857-67. He introduced the observance of Arbor Day in schools, and was considered as the 'father of Village Improvement Societies.' In 1872 he was invited by the Japanese government to establish a system of public education in Japan. Although he declined the honor he rendered such valuable service to that country that he was received as the guest of the Japanese nation.

NORTHROP, CYRUS, LL.D., American educator: b. Ridgefield, Conn., 1834, Sept. 30. He was graduated from Yale in 1857, from its law school in 1859, and was admitted to the bar in 1860. He was clerk of the Connecticut House of Representatives in 1862 and of its Senate in 1863. He became editor of the New Haven *Palladium* in 1863 and in 1863-84 was professor of rhetoric and English literature at Yale. From 1869-81 he was collector of the port of New Haven, and in 1884 he accepted the presidency of the University of Minnesota which he has since held.

NORTHROP, HARRY PINCKNEY: American Roman Catholic bishop: b. Charleston, S. C., 1842, May 5. He was graduated from Mount Saint Mary's College, Emmitsburg, Md., in 1860, studied four years in the theological seminary there and at the American College in Rome, and was ordained to the priesthood in 1865. He held several pastorates in his native city and elsewhere, and was consecrated bishop in 1882 as vicar apostolic of North Carolina, and titular bishop of Rosalia. In 1883 he was transferred by papal brief to the see of Charleston.

NORTH SEA, or GERMAN OCEAN (anc. *Germanicum Mare;* Ger. *Nord See*): arm of the Atlantic Ocean which separates the British Islands on the w. from the European continent on the e.; 700 m. in extreme length (n. to s.), about 400 m. in greatest breadth; not less than 140,000 sq. m. The great commercial highways from the North Sea to the Atlantic are by the Pentland Firth and the Strait of Dover; while on the e. it communicates with the Baltic by the Skagerrack, the Cattegat, Sound, and Great and Little Belts. Along its s.e. and s. coasts, the shores are low, and are skirted by sand-banks formed by the sand deposits carried to the sea by the waters of the Elbe, Weser, Rhine, and Scheldt, the principal rivers that flow from the e. into this sea. The shores of Eng-

land, especially in the s., also are low, and here also sand has accumulated, though not nearly to the same extent as on the continental coasts. The chief British rivers that fall into the North Sea are the Thames, Ouse, Humber, Tyne, Tweed, Forth, and Tay. Besides the sand-banks on the coast, already referred to, others extend to the middle of the sea-bed, similar in their origin to those on the coasts, and occupying altogether about three-fourths of the entire area. Of these, the principal are the bank running n.e. from the mouth of the Firth of Forth 110 m.: the bank extending n.w. from the mouth of the Elbe about the same distance; the Dogger-bank (q.v.), etc. These sand-banks, with the storms and fogs common in the North Sea, render its navigation unusually dangerous. Another peculiarity of the bed of this sea is the number of 'holes' which have been found in it. Of these the most remarkable are the Little Silver Pit of Holderness in Yorkshire, England; and the North-northeast Hole, 8 leagues further east. Little Silver Pit is 25 m. long, and half a mile to two m. wide. At its edges there is depth of 50 to 80 ft. of water, but the 'hole' has a depth of 330 ft. In the n., along the Norwegian coasts, the shores are steep and rocky, and there is a depth of about 190 fathoms. The depth (31 fathoms on an average) increases from s. to n. The currents of this ocean are extremely various, and demand of the navigator great caution. The prevalence of s.w. winds gives the currents a general tendency toward the n.e. On the s.w. coast of Ireland, the great tidal wave of the Atlantic is broken into two portions, one of which, coursing up the Channel, passes through the Strait of Dover; while the other, sweeping n., passes round the n. of Scotland, and then s. along the e. coast of Britain, and meets the southern wave off the coast of Essex. The n. portion of the tidal wave spreads over the whole German Ocean, and though on its entrance into the North Sea it is only 12 ft. in height, it rises in its progress southward, as the sea becomes narrower, in the same way as the *Bore* (q.v.) is formed in a contracting estuary. In the estuary of the Humber, it rises to the height of 20 ft. This sea yields immense quantities of fish, the most important kinds being cod, hake, ling, turbot, sole, mackerel, and herring, also lobsters. The fisheries employ many thousand people. On all available points of the coasts, light-houses have been erected, and there are numerous floating-light vessels moored to detached banks. The traffic on the North Sea is enormous, as this sea borders on countries whose inhabitants have from earliest times been famous on the seas.

NORTH SEA CANAL, or AMSTERDAM CANAL: a canal furnishing the city of Amsterdam direct communication with the North Sea. The insufficient facilities furnished by the North Holland Canal (q.v.), and the hope of reclaiming from the sea a large tract of land which would then become valuable, led to the undertaking 1863. It

was decided to pass through the lake Y, the land between it and the Wijkermeer, through the latter, and across the intervening land to the sea. The Y was closed at its e. extremity, at the Zuyder Zee, by a dam a mile long, supplied with triple locks. In the lakes, embankments were built to form the sides of the canal; and the sand-dunes, for a distance of about four m., were cut through, making the total length a little more than 14 m. The channel is about 195 ft. wide at the water-level, 90 ft. at the bottom, 25 ft. deep. A double lock, about 400 ft. long, 60 ft. wide, 25 ft. deep, was built about 200 rods from the sea-shore; and an artificial harbor was made, inclosing about 250 acres between massive concrete piers. Total expense was about $15,000,000. The ceremonies of opening the canal for public use were participated in by the king 1876, Nov. 1. As the canal receives the drainage of the Y and the Wijkermeer, it has made available for cultivation more than 13,000 acres of land formerly covered with water. Immense steam-pumps carry the surplus water into the Zuyder Zee.

NORTH SYDNEY: Canada, town and port of entry, Cape Breton Island and County, Province of Nova Scotia, on the northern side of Sydney Harbor, five miles north northwest of Sydney; and on the Intercolonial and the Nova Scotia Steel and Coal Company's R.R.'s. Coal is mined in large quantities and there are large shipping interests beside some smaller manufactures. It is the general shipping point for farm products and general merchandise going into Newfoundland. Religious services are held in five church edifices. There are two banks. Besides the public schools, Saint Joseph's Academy (Catholic) is located there. The town was first settled in 1792 by Loyalists and became incorporated in 1885. Its government consists of a mayor elected yearly and a council of eight members elected for two years. The population is mainly English, Scotch, and Irish. Pop. about 5,000.

NORTH TONAWANDA, *tŏn-a-wŏn'da:* N. Y., city in Niagara County; at the confluence of Niagara River and Tonawanda Creek, on the Erie Canal, and on the New York C. & H. R., the Erie, and the Lehigh V. R.R.'s; opposite Tonawanda, and 10 miles above Buffalo. Several other railroads, using leased tracks, and electric lines connect the city with Buffalo, Niagara Falls, and other places. North Tonawanda is in an agricultural region, but the city is noted for its manufacturing and commercial interests. It has large lumber yards, and the chief manufactures are steam pumps, merry-go-rounds, pig iron, bolts, nuts, steam piping, and a variety of lumber products. The public library has about 6,000 volumes. The charter of 1897 provides that the government shall be vested in a mayor, who holds office two years, and a council consisting of two members from each ward, and three at large. The city owns and operates the waterworks. Pop. (1910) 11,955.

NORTHUMBERLAND.

NORTHUMBERLAND, *nawr-thŭm'bĕr-land:* most northern county of England; bounded e. by the North Sea, and n.w. by the Scottish counties of Roxburgh and Berwick; 70 m. extreme length, 53 extreme width; 1.290,312 acres, or 2,016 sq. m.—fifth in size among English counties. The surface of the county has a rugged, and especially in the w. and s.w. a naked and barren, aspect. The Cheviots run along the w. border and send out spurs toward the e., which, gradually declining, are separated by fertile valleys widening as they approach the coast. About one-third of the county is moorland, and along the Cumberland border the broken and bleak-looking hills are valuable for their lead mines. Allenheads, centre of the lead-mining district, is the highest inhabited spot in England, 1,400 ft. above sea-level. The inclination of the surface toward the e. is indicated by the direction of the rivers Alne, Coquet, and North Tyne, which with the Tyne and Till are the principal rivers. The Tweed forms the boundary of the county on the n. for about 5 m.; and the s. boundary is formed in part by the Derwent and Tyne. The climate is cold, but milder on the coast than amid the hills, which, however, produce sufficient herbage for large flocks of 'Cheviot' sheep. The principal agricultural tracts are along the coast, and inland several miles along the river valleys. In these districts, the soil is mostly a strong, fertile, clayey loam, productive in wheat, barley, beans, and clover. Agriculture is pursued on the most improved methods, and cattle, chiefly short-horned, are extensively reared. The s.e. portion of the county is part of the great Northumberland and Durham coal-field, which produces about 25,000,000 tons annually. There are more than 100 pits in operation in the county. Northumberland is traversed by the Newcastle and Carlisle, Northeastern, and Border Counties railways. The county town is Alnwick (q.v.). Pop. of ancient county (1901) 603,498; of administrative county (1901) 387,791.

NORTHUMBERLAND, *nôr-thŭm'bĕr-land*, John Dudley, Duke of: English statesman: b. England 1502; d. London 1553, Aug. 22. During the war with France 1544-5 he commanded the English squadron, and later was one of the executors of the will of Henry VIII. He schemed against Somerset, the Protector, and in 1550 was the dominant influence in the council. The next year he was created Duke of Northumberland, lord high steward, and earl marshal. His fourth son, Lord Guilford Dudley married Lady Jane Grey in May 1553, and the duke persuaded Edward VI. to name her as his successor. Through Northumberland's influence she was placed on the throne July 10, but on the 22d of August following he was executed for high treason.

NORTHUMBERLAND, Robert de Mowbray, Earl of: English warrior: d. about 1125. He was a son of Roger de Montbrai, a follower of William the Conqueror, and was made Earl of Northumberland some time not

far from 1080. He was constantly engaged in feudal quarrels in the course of which he burned Bath and ravaged Wiltshire, and when Malcom, king of Scots, invaded the country for a second time in 1093 he was met and slain by Mowbray at Alnwick. He raised an insurrection in 1095 and endeavored to wrest from the Conqueror's sons the crown and give it to their cousin, Count Stephen of Aumâle. At first successful he was finally forced to retreat to his great castle of Bamborough where, after a stout resistance, he was finally taken, and though reports conflict, it is reasonably certain that the remaining 30 or more years of his life were spent in prison. He founded the priory at Tynemouth.

NORTHUMBERLAND, Earls of. See Percy.

NORTHUMBRIA, *nawrth-ŭm'brĭ-a:* largest kingdom in the Saxon heptarchy, formed by the union of the two kingdoms Bernicia and Deira, under Prince Ida, 547. As its name indicates, it embraced the region n. of the Humber and extended to the Firth of Forth. It was divided after the death of Ida, but re-established as one kingdom by Ethelfrith 593, and became the leading power in Britain under Oswald 634-42. Its extinction occurred under Egbert 827, when, united with Wessex and minor states, it was merged into a kingdom to which the name England was first applied. The modern co. Northumberland derives its name from the kingdom, many times larger than itself.

NORTH'WEST BOUNDARY DISPUTE: the disagreement between the United States and Great Britain from 1814 to 1846, respecting the northwest frontier. The territory bounded north by latitude 54° 40′, east by the Rocky Mountains, south by latitude 42°, and west by the Pacific Ocean had been claimed at various times and to various exteuts by Russia, Spain, Great Britain, and the United States. The Russian claim, which rested mainly upon occupation by fur traders, was settled by a treaty 1825, Jan. 11. Under this treaty the United States was to make no settlements north of latitude 54° 40′, and Russia none south of that latitude. Great Britain and Russia agreed upon the same terms. The Spanish claims were confined south of latitude 42° by the treaty which ceded Florida in 1819. Great Britain had little or no claim by discovery. The United States' claim rested upon the voyage of Gray up the Columbia River in 1792 and the explorations of Lewis and Clark through the Rocky Mountains and through the Oregon country in 1805-6, under the orders of Jefferson. By the treaty of 1818, Oct. 20, the whole territory west of the Rocky Mountains was to be opened to both countries for 10 years, and, in 1827 the joint occupation for an indefinite period was agreed upon. Later this produced dissatisfaction, and after considerable negotiation, Great Britain was induced in 1846 to accept latitude 49° as the boundary from the Rocky Mountains to the channel be-

tween Vancouver's Island and the mainland. See BOUNDARIES OF THE UNITED STATES, DISPUTES AND SETTLEMENTS: ALASKA.

NORTHWEST COMPANY, THE: an organization of French-Canadian traders who, in the 18th century, entered the fur trade as a rival of the Hudson's Bay Company, which had enjoyed a monopoly for 200 years. In 1805 the Northwest Company established trading posts on the Pacific coast and in 1813 absorbed the Pacific Fur Company, established by John Jacob Astor. In 1821 the Northwest Company consolidated with the Hudson's Bay Company.

NORTHWESTERN COLLEGE: a co-educational institution in Naperville, Ill.; founded by the Evangelical Association in 1861. In 1907 there were connected with the school 21 professors and instructors and 458 students. The library contained about 8,500 volumes: the grounds and buildings were valued at $120,000; the amount of productive funds was $300,000; the income, about $27,000; and the benefactions, $5,000. The number of graduates is about 650.

NORTHWESTERN UNIVERSITY: Ill., chartered under the auspices of the Methodist Episcopal Church, in 1851, and first opened in 1855. The first department organized was the collegiate department: the present organization includes (1) the College of Liberal Arts; (2) the Medical School; (3) the Law School; (4) the School of Pharmacy; (5) the Dental School; and (6) the School of Music; the College and the School of Music are at Evanston, Ill., and the professional schools in the city of Chicago. The university also maintains three secondary schools, namely, the academy at Evanston, Grand Prairie Seminary at Onarga, Ill., and Elgin Academy at Elgin, Ill. The Garrett Biblical Institute, a theological school under separate management, is located on the college campus, and is in close co-operation with the university; the Norwegian-Danish Theological School and the Swedish Theological Seminary are affiliated with the institute. The work of the College of Liberal Arts is mainly elective, the courses being arranged for major work in one department and minor work in another; the degrees of A.B. and B.S. are conferred; the corresponding master's degrees and the degree of doctor of philosophy are conferred for graduate work. The government is by a board of 36 trustees elected by the board, to which are added 8 chosen by Church conferences. Women are admitted, and dormitories on the campus are provided for their use. The campus contains about 75 acres of ground, on the shores of Lake Michigan; the buildings include the old college, the first building erected, University Hall, the Fayerweather Hall of Science, the gymnasium, the observatory, and the library. The professional schools occupy their own buildings in Chicago, the law school, school of pharmacy, and dental school being in

Northwestern University Building at the corner of Lake and Dearborn streets, and the medical school having two buildings on Dearborn street, between 24th and 25th streets. There is a large athletic field, and the athletic affairs of the university are under the management of a committee of 15, 5 from the faculty, 5 from the alumni, and 5 from the students. The Students' Debating Society is affiliated with the Central Debating League, including the students' societies of the universities of Michigan, Chicago, and Minnesota; and with the Northern Oratorical League, including societies from the universities of Michigan, Wisconsin, Iowa, Chicago, Minnesota, and Oberlin College. The college library contains over 70,000 volumes, besides 35,000 pamphlets, and the professional schools have also special libraries. In 1907 the productive funds amounted to $3,967,277, and the annual income was $591,671; number of students in attendance, 4,000; number of professors, 203.

NORTHWEST FRONTIER PROVINCE: since 1901, a new political division of British India, formed out of the northwestern portion of the Punjaul province, and comprising mainly the Peshawar district bordering on Afghanistan, and portions of other districts lying beyond the Indus. The principal towns are Peshawar, the capital, Kohat, Dera Ismail Khan, Edwardesabad, Kalabagh, Abbotabad, Yank and Kulachi. Area 13,197 sq. m.; pop. 2,044,000.

NORTHWEST PASSAGE. See NORTHEAST AND NORTHWEST PASSAGES; POLAR EXPEDITIONS; ARCTIC REGIONS.

NORTHWEST PROVINCES: India, until 1901, the designation of a political division now THE UNITED PROVINCES OF AGRA AND OUDH (q.v.).

NORTHWEST TERRITORIES: Canada, a former political division comprising the districts of Assiniboia, Alberta, Saskatchewan, Athabasca, Mackenzie, Ungava, Franklin, Keewatin, and the Yukon Territory. The districts of which it was composed were created at different dates and, with their respective areas, may be seen in the following table:

DISTRICT	Date of Organization		Area
Keewatin	1876, April	12	470,416 sq. miles
Assiniboia	1882, May	17	88,879 sq. miles
Saskatchewan	1882, May	17	107,618 sq. miles
Alberta	1882, May	17	101,883 sq. miles
Athabaska	1882, May	17	251,965 sq. miles
Yukon	1898, June	13	196,976 sq. miles
Mackenzie	1895, Oct.	2	562,182 sq. miles
Ungava	1895, Oct.	2	354,961 sq. miles
Franklin	1895, Oct.	2	500,000 sq. miles

By order-in-council, 1897, Dec. 18, the boundaries of Ungava, Keewatin, Franklin, Mackenzie and Yukon were somewhat changed. In 1898 the Yukon was made a separate territory. The District of Franklin, it may be added, is a somewhat indeterminate phrase, the area being estimated and its northern boundaries not fully

settled. The government of these territories, in a local sense, was centred in Regina (1882) before the people were given even the partial privilege of governing themselves. The first lieutenant-governor was Hon. A. G. Archibald, appointed on May 10, 1870, and for many years the government was carried on by him and his successors, the lieutenant-governors of Manitoba, without popular control. In 1880 they were given a separate lieutenant-governor and council. In 1886 the territories were accorded representation in Parliament: in 1888 a local legislature was established and the first elections held and an advisory council formed for dealing with matters of finance; in 1891 additional powers were given to the legislature and in 1897, by special federal enactment, an executive council was established responsible to the legislature.

The first appointments to this body were made in 1898 with Mr. F. W. G. Haultain as premier, attorney-general and treasurer. He had already been for ten years the practical head of the local government. In this position he remained until 1905 when the new provinces were created. His successive assistants during this long period were Messrs. Hillyard Mitchall, C. A. Magrath, J. H. Ross, G. H. V. Bulyea, A. L. Sifton and W. Elliot. In 1902 there began a practical and insistent demand for full provincial powers including control of lands and mines, taxation and the right to borrow money. This continued actively until its settlement in the autonomy events of 1905. After the passage of the Acts of 1905, carving the new provinces out of this region, a reorganization of the territories took place, under the old designation. By the terms of this legislation they were to now comprise the region formerly known as Rupert's Land and the Northwestern Territory, with the exception of Manitoba, the new provinces, Keewatin and the Yukon; including, also, all other British territories and possessions in Northern Canada and all islands adjacent thereto with the exception of Newfoundland and its dependency of Labrador. The federal authorities were given power to appoint a commissioner for the Northwest territories, who should administer its government 'under instructions from time to time given him by the governor-in-council or the minister of the interior.' A council of not more than four persons was also authorized for appointment by the federal government to aid the commissioner and the latter, in council, was given the same power to make ordinances as had been vested in the legislative assembly of the former territories.

The climate of the former territories generally is of an Arctic character with long and rigorous winters, and short summers; the agricultural capabilities of a part of this region to the south, however, are very great. The fertile belt of the Saskatchewan alone contains an area of 64,000 square miles in one continuous strip of 800 miles long, with an average breadth of 80 miles. But the

best and largest wheat area is beyond the Saskatchewan, in the valleys of the Athabasca and Peace rivers, and extending through the Peace River Pass to the western slope of the Rocky Mountains, and north to lat. 60° N. The lakes and rivers west of Lake Superior are bordered by rich prairies and luxuriant woods. Coal is abundant and is now worked; petroleum is plentiful; copper, silver, iron, salt, and gold have been found, the last especially on the Klondike River in the Yukon district. Great quantities of furs are obtained. The Canadian Pacific Railway crosses the southern part of this territory, and there are several other railways made or to be made. In the towns and villages springing up along the lines of railway free schools are established, and in the Rocky Mountain region five tracts of land have been reserved as national parks. See CANADA.

NORTHWEST TERRITORY: the name given by the Continental Congress of America, in 1787, to a region east of the Mississippi, north of the Ohio, south and west of the Great Lakes, and west of Pennsylvania. The greater part of this territory belonged to France prior to 1763, when, by treaty, Great Britain became possessor of all the domain east of the Mississippi, in North America, which had been claimed by France. The territory west of the Alleghany Mountains and north of the Ohio River was, in 1774, annexed to the Province of Quebec. By the treaty of peace with Great Britain, at the close of the Revolutionary War, in 1783, this region was ceded to the United States. Its area was about 265,878 square miles, and it bordered on all the great interior waterways of North America which had then been explored; the Saint Lawrence River because a part of the Great Lakes not excluded. The exact status of this territory was a subject of dispute for several years, on account of the conflicting claims of ownership of New York, Virginia, Connecticut, and Massachusetts. The States mentioned cited in support of their claims various early grants from the Crown, and conquests of Indian tribes. The original Colonial charter usually gave definite north, east, and south boundaries, but that of the west was often the sea, the South Sea, the ocean, etc., which was interpreted as Pacific Ocean. The other States of the Union refused to recognize the claims based on charters and acts as cited, but held that the lands in question should belong to the whole Union and should be administered for the common good. Congress in session, in 1780, gave a pledge to the Union that if the States claiming this western territory should cede it to the Confederation it should be used for the good of all the States, and should, in due time and under proper conditions, be admitted as States of the Union, with equal rights and privileges with the original States. New York was the first to cede her claims, in 1781; three years later Virginia ceded her claims, except a section north of the Ohio River (now the southern part of the State of Ohio) called for sometime the 'Virginia Military District.' In

1785 Massachusetts gave up her claims, and in 1786 Connecticut ceded all except a strip extending from the Pennsylvania boundary westward 120 miles, comprising about 6,000 square miles and called the 'Western Reserve.' Connecticut retained jurisdiction over this territory until 1800. A tract of 500,000 acres, in the western part of the 'Western Reserve,' was donated by Connecticut as 'Fire Lands' to be divided as directed among such of its citizens as had been damaged by incursions of the British troops during the Revolutionary War. On July 13, 1787, the 'Northwest Territory' was established by the Continental Congress. The ordinance was prepared by the chairman of the committee, Nathan Dane of Massachusetts. This ordinance provided for the enactment of certain rules deemed necessary for the public good, the chief provisions of which were (1) that not less than three nor more than five States should be formed out of the 'Northwest Territory'; (2) that slavery should be prohibited forever within its borders; (3) that religious freedom should be wholly and entirely established and maintained: (4) that schools and means of education should be forever encouraged; (5) that the writ of habeas corpus and trial by jury should be guaranteed to all its inhabitants. A form of government was provided for and the territory was divided. It was further provided that when any one of the divisions had a population of 60,000, it might be admitted into the Union as a State. Certain conditions of admission were exacted in accordance with the Ordinance of 1787. The Continental Congress which established the 'Northwest Territory' and so wisely provided for its admission into the Union, had its last roll-call 1788, Oct. 10.

The new Congress confirmed the Ordinance relating to this territory. At first the government was administered by means of a governor, secretary, and three judges appointed by Congress, who governed the whole as one district. The governor and judges sitting together had power to make and execute such laws as they deemed needful for the district, subject to the approval of Congress, until such time as the territory would have a legislature of its own. Provision was made for a legislature when there were in the territory 5,000 free male inhabitants of full age to be voters. This legislature was to consist of a Legislative Council of five members, chosen by Congress, and a House of Representatives chosen by male inhabitants who were freeholders. The first governor of the Northwest Territory, Arthur St. Clair, was appointed 1787, October. He arrived at Marietta, the capital, 1788, July. His first official act was the founding of Washington County. He appointed magistrates, established courts, arranged for defense against the Indians, and in every way sought to promote the advancement of the country. The first legislature of the Territory met 1799, Sept. 24. The House of Representatives had 22 members, representatives of the nine counties of the whole Territory. In 1800, May, upon

petition, Congress divided the Northwest Territory into two territorial governments; the boundary between which was a line extending from the mouth of the Kentucky River north to Canada. The portion east of this line was called 'Territory Northwest of the River Ohio,' and its capital was Chillicothe. The portion west of this line was called 'Indiana Territory,' and the capital was Vincennes. William Henry Harrison was first governor of the 'Indiana Territory.' Virginia completed her articles of cession 1784, March 1. On that same day Jefferson, as chairman of a committee, proposed a plan which was adopted by Congress 1784, April 23. The territory was to be divided into States, each State two degrees wide and the lines to be intersected by two meridians, one passing through the falls of the Ohio and the other through the mouth of Kanawha River. The States were to be named, Chersonesus, Assenisipia, Sylvania, Pelisipia, Illinoia, Polypotamis, Washington, Mesopotamia, and Michigania. Slavery or involuntary servitude were to be allowed only as a punishment for crime. The plan never went into effect, and was superseded by the Ordinance of 1787 whereby the Northwest Territory was established as mentioned. In 1785, the year Massachusetts yielded her claims, Congress provided for a survey of the lands in dispute. Ohio, the first State formed out of the Northwest Territory, was admitted in 1803, and was the 17th State of the Union. Michigan Territory was created 1805, January, and William Hull was first governor. It was admitted as a State in 1837. Illinois Territory was organized in 1809; Kaskaskia was the capital. It was admitted as a State 1818, Dec. 3. Indiana was admitted as a State in 1816. A part of Michigan Territory was in 1836 organized as the Territory of Wisconsin. It became a State in 1837. A part of the Territory of Wisconsin is now the eastern part of Minnesota.

NORTON, *nawr'ton*, ANDREWS, D.D.: biblical scholar and Unitarian theologian: 1786, Dec. 31—1853, Sep. 18; b. Hingham, Mass. He graduated at Harvard, 1804; was appointed 1809 tutor in Bowdoin College, 1811 mathematical tutor at Harvard, and 1813 librarian of the university; and succeeded Dr. Channing as lecturer on biblical criticism and interpretation. In 1819 he was appointed Dexter professor of sacred literature, which office he retained until failing health compelled his retirement 1830. Dr. Norton was, after Dr. Channing, the most distinguished exponent of Unitarian theology, a clear and perspicuous lecturer, an able and conservative critic, and a voluminous writer. Rejecting the dogma of the Trinity, and protesting against Calvinism, he equally opposed the school of Theodore Parker and the naturalistic theology. Besides his contributions to the *General Repository and Review*, the *North American Review*, *Christian Examiner*, he published (1833) *A Statement of Reasons for Not Believing in the Doctrine of*

the Trinity; (1837-44, Boston, 3 vols.; 2d ed. Cambridge 1846; abridged ed. 1867, 1 vol.) *Evidences of the Genuineness of the Gospels*—a work of high authority among scholars in Amer. and Gr. Britain; (1839) *On the Latest Forms of Infidelity;* and left some poems and a translation of the gospels. His poetic gift appeared in hymns which have been widely esteemed. He died at Newport, R. I.

NORTON, Caroline Elizabeth Sarah Sheridan: English poet and novelist: b. London 1808; d. there 1877, March 15. A granddaughter of Richard Brinsley Sheridan and a sister of Lady Dufferin, she showed her talent at 13 with *The Dandies' Rout.* She was married to George Chapple Norton in 1827; procured for him a police magistracy by her influence with the Home Office; broke with her husband in 1836, when he accused Lord Melbourne of criminal intercourse with her; and was vindicated entirely of this charge in a famous suit, the basis of Dickens' Bardell *v.* Pickwick, in the *Pickwick Papers.* Her differences with her husband were not then ended, for he claimed the custody of her children and the income from her writings. She wrote *English Laws for Women in the Nineteenth Century,* a pamphlet which contributed to the change of English laws as to the status of women. Two weeks before her death Mrs. Norton married Sir William Stirling Maxwell. Her principal works are: *The Sorrows of Rosalie* (1829), a Byronic poem; *The Dream* (1840); *The Lady of La Garaye* (1862), her best poem, which has much the tone of Campbell; *A Voice from the Factories* (1836); and *The Child of the Islands* (1845), both attacking social conditions; and the novels, partly autobiographical, *Stuart of Dunleath* (1851), *Lost and Saved* (1863), and *Old Sir Douglas* (1867).

NORTON, Charles Eliot, litt.d., l.h.d., ll.d., d.c.l.: American scholar: b. Cambridge, Mass., 1827, Nov. 16. He was a son of Andrews Norton (q.v.) and after he was graduated from Harvard in 1840 was for a time in the employ of a Boston establishment in the India trade. Except a voyage to India in 1849 and various trips to Europe his life has been passed in the house where he was born. During the Civil War period he edited the papers of the Loyal Publication Society and with his friend, J. R. Lowell, edited the *North American Review* 1864-8. From 1874 to 1898 he was professor of the history of art at Harvard, becoming professor emeritus in the year last named. As a Harvard professor he exercised a salutary influence over successive generations of collegians before whom he placed the highest ideals of both scholarship and citizenship. Hundreds of young men were helped by him to quicker perception of what culture really is as well as to discriminate discernment between true and false culture—between thoughtful, intelligent citizenship, and the noisy, puppyish assertion that so often passes itself off as patriotism. Few Ameri-

cans have been sterner critics than he of whatever in American life falls below an ideal standard, and as a consequence few men, not professedly politicians, have been the target for so much adverse comment as has Professor Norton. Stigmatized often as unpatriotic he has risen to a much higher level of patriotism than his critics. He has enjoyed the friendship of many of the foremost personages of his time and has been the literary executor of such men as Lowell, Carlyle, Emerson, Curtis, and Ruskin. He is the foremost of American Dante scholars and was the founder of the American Dante Society, as well as of the Archæological Institute of America, of which he was the president for many years. His published books include: *Considerations on Some Recent Social Theories* (1863); *The New Life of Dante* (1859, a partial translation with essays, followed by a complete translation); *Notes of Travel and Study in Italy* (1860); *Historical Study of Church Building in the Middle Ages* (1880); *The Divine Comedy of Dante* (1891-2), a much prized prose translation. He has also edited *The Early Letters of Thomas Carlyle* (1886); *Letters of James Russell Lowell* (1894); etc.

NORTON, Charles Led'yard: American author: b. Farmington, Conn., 1837, June 11. He was graduated at Yale in 1859; served in the Federal army during the Civil War; was editor of the *Christian Union* 1869-79, and in 1893 became editor of *Outing*. He has published *Canoeing in Kanuckia* (1878), with J. Habberton; *Handbook of Florida* (1890); *A Medal of Honor Man; or, Cruising Among Blockade-Runners* (1896); *A Soldier of the Legion; The Queen's Rangers; Political Americanisms* (1890); etc.

NORTON, Charles Stewart: American rear-admiral: b. Albany, N. Y., 1836, Aug. 10. He was graduated at the United States Naval Academy in 1855; became commander in 1870, captain in 1881, commodore in 1894; and was promoted rear-admiral in 1897. During the Civil War he served with honor at Charleston, Hampton Roads, and Port Royal. After the war he served on the board of inspection and survey; commanded the South Atlantic station in 1894-6, and was in charge of the Washington navy yard and station 1896-8. He was retired in the year last named, having reached the age limit.

NORTON, Frank Henry: American journalist: b. Hingham, Mass., 1836, March 20. He was connected with the Astor Library in New York (1855-65) as assistant librarian and assistant superintendent, and entering journalism in 1872 was editor and owner of the New York *Era* 1879-81, and from 1883 to 1891 on the staff of the New York *Herald*. Besides such dramatic burlesques, etc., as *Alhambra, Cupid and Psyche*, he has written *Life of Alexander H. Stephens* (1883); *The Malachite Cross* (1894); etc.

NORTON, John: American colonial clergyman: b. Shortford, Hertfordshire, England, 1606, May 6; d. Boston, Mass., 1663, April 5. He was educated at Cambridge University, entered the ministry and in 1635 left England and came to Boston. He was pastor at Ipswich in 1636-52: then he succeeded John Cotton as colleague of John Wilson in the pastorate of the First Church of Boston. In this charge his influence steadily increased and his opinions came to be sought by officials of both church and state. He was still in this position when the colonies decided to send their petition to George II. in 1662, and was selected to accompany General Bradstreet; though the petition was nominally granted and Norton had without doubt performed his delicate task with fidelity, the colonies were dissatisfied with the results and henceforward his popularity waned. This change in public feeling was without doubt the cause of his death in the following year. He wrote: *Responsio ad Totam Questionum Lyilogen; The Orthodox Evangelist* (1654); *The Heart of New England Rent by the Blasphemies of the Present Generation* (1660); etc.

NORTON, Lillian. See Nordica, Lillian.

NORTON, Sidney Augustus, M.D., Ph.D., LL.D.: American chemist: b. Bloomfield, Trumbull County, Ohio, 1835, Jan. 11. He was graduated from Union College, Schenectady, N. Y., in 1856 and from Miami Medical College in Cincinnati 1867, in which latter institution he was professor of chemistry 1867-72. In 1873 he became professor of chemistry in Ohio State University, and is now professor emeritus. He has published: *Elements of Natural Philosophy* (1870); *Essays and Notes* (1874); *Elements of Physics* (1875); *Elements of Inorganic Chemistry* (1878); *Organic Chemistry* (1884); etc.

NORTON, Thomas: English dramatist: b. Bedfordshire, England, 1532; d. England 1584. He collaborated with Sackville in writing *The Tragedie of Gorboduc* (1560-1) which was the first English blank-verse tragedy.

NORTON, Thomas Herbert: American chemist and consular officer: b. Rushford, N. Y., 1851, June 30. He was graduated from Hamilton College, Clinton, N. Y., in 1873 and afterward studied at Heidelberg. From 1878 to 1883 he was manager of important chemical works in Paris, France, and was professor of chemistry in the University of Cincinnati 1883-1900. In May 1900 he was appointed to establish the United States consulate at Harput, Turkey; was in Persia during 1904-5 on a government mission; was American consul at Smyrna, Turkey, 1905, March—1906, July; and since 1906, July, was consul at Chemnitz, Saxony.

NORTON SOUND: an arm of Bering Sea indenting the west shore of Alaska. It is about 220 miles long and 200 miles wide from Cape Nome to Cape Dyer. The Yukon is the largest river flowing into the Sound, a number of short streams enter from the north. The

coast is irregular, the largest indentations are Golofnin and Norton bays and Golofnin Sound. A number of islands are along the coast, the largest are in the eastern part of the Sound. Nome (q.v.) is the most important city on the coast. Captain Cook discovered Norton Sound in 1778.

NORUMBEGA, *nō'rŭm-bē'ga:* a name given by the early explorers to various parts of the eastern coast of North America, also to a river, and to an Indian city. In 1539 the name was applied to the whole coast from Cape Breton to Florida, but this seems to have been on the authority of an anonymous narrative called *Dieppe Captain.* The map of Verrazano's voyage, published in 1529, locates Aranbega on the coast of New England; Mercator's map, published in 1541, locates Anorumbega near the Hudson River; Gastaldi's map, 1556, locates Norumbega near Cape Breton. Other accounts mention Norumbega as a large river, brackish near the mouth; and still others picture it as a city with high towers and substantial houses. The rivers mentioned are supposed to have been Penobscot, Connecticut, or Hudson. Champlain, in 1605, applied the name to Maine and also to the Penobscot River. Humphrey Gilbert (q.v.) in 1583, began an exploration of the beautiful country of Norumbega, and so convinced was he of its existence, that he took with him a poet to sing its praises. A map of 1582 makes Penobscot River a strait connecting the Saint Lawrence with the ocean at the mouth of the Penobscot. The country between was called Norombega. The origin of the word has been attributed to many languages; as an Indian word meaning 'still water'; a Spanish word meaning 'fields'; a Norse word, *Norvegr,* meaning Norway; etc. In 1889, Prof. Horsford caused the erection of a memorial tower at the confluence of the Charles River and Stony Brook, near Watertown, Mass., in memory of Norumbega, a Norse city which once existed here. Considerable research has been given to the matter, and some historians claim to have reasonable proof of the origin and location of what by many is considered a mythical city or a name applied by different explorers to different rivers and locations on the coast between Cape Breton and Florida. Consult: Fiske, *Dutch and Quaker Colonies in America;* Horsford, *Defenses of Norumbega;* and *Discovery of Ancient City of Norumbega;* Beauvois, *La Norambègue.*

NORVAL, *nôr'val,* YOUNG: son of Lady Randolph and her first husband, Sir Malcolm Douglas, in Homes' tragedy, *Douglas* (1757). He is reared in obscurity and his identity is revealed to Lady Randolph only after he has saved the life of his stepfather. Glenalvon, the latter's heir, jealous of Norval, incites Lord Randolph's jealousy against him and a duel ensues in which Glenalvon is killed and Norval dies immediately after, whereupon Lady Randoph flings herself from a precipice. The part was much favored by both Kemble and Macready.

NORWALK.

NORWALK, *nawr'wŏk:* township in Fairfield co., Conn., including the city of N., two or three villages, and the city of South N. It is on Long Island Sound, the New York, New Haven and Hartford railroad, a branch of the Housatonic, and a terminus of the Danbury and Norwalk railroad; 42 m. n.e. of New York, 60 m. s.w. of Hartford. The N. river passes through the town and enters the Sound. There is a safe harbor of considerable size; and at low tide, vessels drawing 6 ft. can pass up the river. Steamers and other vessels run regularly between N. and New York. There are fine churches, several good public schools and boarding-schools, a public library, public halls, opera-houses, weekly newspapers, national and savings banks, and hotels. There is a street railroad, a complete system of water-works, gas-works, and an organized fire department. Many of the streets are paved, there are numerous shade-trees, and from the low hills within the town limits very fine views of the adjacent country and of the Sound are obtained. The bay is a favorable place for oysters, which are grown and shipped in great quantities. About $2,000,000 capital is said to be invested in this industry. There are large foundries and iron-works, a paper-mill, several woolen-mills, a pottery, a large lock factory, three shoe-shops, seven fur-hat factories, and the most extensive straw-hat works in the country. There are also carriage-shops, machine-shops, ship-yards, chemical works, and extensive greenhouses and grounds in which flowers are grown for the New York market. There are many fine residences; and in South N. many people doing business in New York have their homes.—The site of N. was bought from the Indians 1640, but a permanent settlement was not made till 1651. According to a tradition, the purchase included the land between two rivers extending a distance of one day's walk north from the sea. The tribe from which the land was obtained was called Northwalk or Norwalk; and the river, and finally the settlement, received the name. N. was incorporated as a town 1653. During the revolution, the town was burned by the Hessians. It was incorporated as a city in 1893, and South N. received a city charter 1870. Pop. (1880) 13,956; (1890) 17,749; (1900) 19,932; (1910) 24,211.

NOR'WALK: city, cap. of Huron co., O., on the Lake Shore and Michigan Southern and the Wheeling and Lake Erie railroads; 56 m. from Toledo and the same distance from Cleveland. There are 14 churches; graded schools; one daily and five weekly papers, one of the latter printed in German; two national banks, a state bank, and a private savings bank. The manufactures include organs, knitting-machines, sewing-machines, plows, and shoes. There are also breweries, tobacco factories, grist-mills, and lumber-mills, and railroad repair shops. The streets are paved, there are water-works, and the city is lighted with gas. It is in a fine agricultural region. Pop. (1870) 4,498; (1880) 5,704; (1890) 7,195; (1910) 7,858.

NORWAY, *nawr'wā* (Norwegian, *Norge*): an independent Kingdom since 1905, Oct. 26, when it separated from the union with Sweden, effected 1814. The w. portion of the Scandinavian peninsula, it is bounded e. by Sweden and Russia, and on every other side is surrounded by water, having the Skagerrack to the s., the German Ocean to the w., and the Artic Sea to the n.; length about 1,100 m., greatest width about 250 m.; but between the lats. 67° and 68°, it measures little more than 25 m. in breadth. The following table shows the area and pop. of the 20 amts. into which N. is divided, as given in the last census.

Amts.	Eng. Sq. Miles.	Pop. 1891.	Pop. 1900.
Smaalenene	1,599	120,433	136,886
Akershuus	2,054	98,973	116,228
Christiania	6	150,444	227,626
Hedemarken	10,618	118,998	126,182
Christians	9,792	107,793	116,280
Buskerud	5,736	104,723	112,676
Jarisberg and Laurvik	895	101,001	104,554
Bratsberg	5,863	91,815	99,052
Nedenæs	3,608	81,068	79,935
Lister and Mandal	2,804	78,789	81,567
Stavanger	3,531	117,078	127,592
Söndre Bergenhuus	6,024	128,125	135,752
Bergen (town of)	3	53,686	72,251
N. Bergenhuus	7,145	87,663	89,041
Romsdal	5,785	127,773	136,137
S. Trondhjem	7,188	123,563	135,382
N. Trondhjem	8,762	81,134	83,433
Nordland	14,655	131,837	152,144
Tromsö	10,132	65,090	74,362
Finmarken	18,295	29,110	32,800
Total	124,495	1,999,176	2,239,880

Of the total pop. (1891) 474,129 lived in towns. Pop. (1865) 1,701,756; increase (1865-1900) 538,124.

The Scandinavian peninsula consists of more or less connected mountain masses, which, in the s. and w. of N., constitute one continuous tract of rocky highlands, with steep declivities dipping into the sea, and only here and there broken by narrow strips of arable land. S. of Trondhjem (63° n. lat.), the ridge expands over nearly the entire breadth of Norway. The n. portions of the range, known as the Kjöllen Fjelle,* occupy a space about 25 m. in width, and form, as far n. as 69°, the boundary-line between Sweden and Norway. South of 63° n. lat., the range of the Scandinavian mountains is known as the Norska, or Dovre Fjelle, though the latter name belongs properly only to the part immediately in contact with the Kjöllen. The general elevation of the Norska Fjelle does not rise above the line of perpetual snow, whose average height in these latitudes is 5,000 ft.; but it ranges

* *Fjelle* is the plural of *fjeld*, a mountain-side.

above that of the growth of trees, which may be stated at 4,000 ft. Only two carriage-roads traverse the Norska Fjelle, the one connecting Christiania with Bergen, and the other with Trondhjem. The Justedal glacier, in Bergen amt, is the largest on the continent of Europe; area 588 sq. m. The whole w. coast of N. is densely fringed with islands and insulated rocky masses, which, n. of 68°, in the Lofoden (q.v.) group, assume larger dimensions, and form extensive insular districts. The more important are Hindö (357 sq. m., pop. 8,190), on the borders of Nordland and Tromsö; Langö (147 sq. m., pop. 5,812); Karmö (only 21 sq. m., pop. 11,827); Senjen (273 sq. m., pop. 3,339). To the s. of the Anden group, near the little islands Mosken and Værö, occurs that eddying whirl of counter-currents known to us as the Malström; but with this and a few similar exceptions, no serious obstacles impede navigation along the numerous channels of the coasts. The most important of the rivers are the Glommen (350 m. long, basin 6,657 sq. m.), the Drams-Elv, of less than half the length and basin, Tanæ, Pasvikel, Skiens, Laagen, and Vormen. These and numerous other streams are of more importance for floating down timber to the fjords than for navigation. The fjords or inlets form a characteristic feature of Norwegian scenery, and give a coast-line of more than 800 miles.

The most considerable of the lakes of N. is the Mjösen, near Christiania; but even this lake, in some places more than 1,400 ft. deep, is scarcely 60 m. long, and has an area less than 200 sq. miles. Swamps and morasses, which occupy a large area, have of late years engaged the attention of the government, which is endeavoring to drain and utilize them for agricultural purposes, and with a view of converting them into fields of turf and peat for fuel.

Climate, Soil, etc.—The peculiar physical character of N. necessarily gives rise to great varieties of climate in different parts of the country. The influence of the sea and of the Gulf Stream, and the penetration into the interior of deep inlets, greatly modify the severity of the climate, especially on the w. coast. Thus, while the mean annual temperature is for Christiania, on the e. coast, 41°, it is 46°·8 Fahr. for Bergen, on the w. coast, which is only 30′ further north. On the coast generally, rain and fogs prevail; while in the regions near the North Cape, storms are almost incessant. In the interior, the air is clear and dry, the winters are cold and the summers hot, while on the coasts the conditions are different. The longest day, which in the south is 18 hours, may be said to be nearly three months in the high latitudes of the n. districts, where the longest night lasts almost an equal time. The protracted winter of the n. regions follows almost suddenly on the disappearance of the sun, when the absence of solar light is compensated for by the frequent appearance of the aurora borealis, which shines with sufficient intensity for the prosecution of ordinary occupations.

NORWAY, SWEDEN AND DENMARK
SCALE OF MILES
0 100 150 200 250
ARCTIC OCEAN
NORWEGIAN SEA
ATLANTIC OCEAN
NORTH SEA
BALTIC SEA
GULF OF BOTHNIA
GULF OF FINLAND
GULF OF RIGA
LAPLAND
NORRLAND
SWEDEN
NORWAY
DENMARK
GOTHLAND
JUTLAND
ZEALAND
FUNEN
LOFODEN ISLANDS
VESTERAALEN
MOSKENESO
MALSTROM
VIGTEN IS.
DONNESO
VEGEN
ROMSDAL IS.
FRISIAN IS.
ALAND IS.
GOTHLAND
OSEL
DAGO
BORNHOLM
RUGEN
SKAGERRACK
CATTEGAT
Arctic Circle
Altengaard
Tromsö
Bodo
Rodoo
Alstahoug
Namsos
Levanger
Trondhjem
Molde
Aalesund
Kristiansund
Bergen
Stavanger
Flekkefjord
Christiansand
Lillehammer
Laerdal
Gudvanger
Honefoss
Roldal
Kongsberg
Skien
Larvik
Frederikshavn
Skagen
Frederikshavn
Thisted
Aalborg
Aarhus
Ringkjobing
Esbjerg
Veile
Frederica
Odense
Svendborg
Nyborg
Nykjobing
Kiel
Oldenburg
Lubeck
Travemunde
Rostock
Stralsund
Gefle
Hernosand
Sundsvall
Ostersund
Westernorland
Ratan
Vasa
Gamla Karleby
Uleaborg
Torneå
Haparanda
Pitea
Lulea
Skeleftea
Arjeplog
Gellivare
Kengis
Sulitelma
Stora Lulea Jaur
Alte Vand
Tornea Tresk
Kalix R.
Tornea R.
Lamio R.
Muonio R.
Allen R.
Tana R.
Enara L.
Varanger Fjord
Vardo
Vadso
Varag Njarg
Hammerfest
Gjesvar
North Cape
Porsanger Fjord
Kvenangen Fjord
Lyngen F.
Soro
Alten Fd.
Stjerno Sd.
Tana Fjord
Nordkyn
Trondhjem Fjord
Folden Fd.
Thosen Fd.
Vigten
Namsen
Snaasen Vand
Stromsvand
Watthdal
Kall L.
Storsa
Storen
Molde Fd.
Romsdal
Sognefjord
Hardanger Fjord
Hardanger Field
Gudvanger
Aurdal
Mosen L.
Hamar
Elverum
Wolderas
Orsa
Mora
Siljan L.
Malung
Leksand
Linghed
Falun
Dala R.
Gefle
Dannemora
Upsala
Sala
Filipstad
Kongsvinger
Christiania
Drammen
Christiania Fd.
Frederikstad
Frederikshald
Kristinehamn
Arboga
Eskilstuna
Westeras
STOCKHOLM
Askersund
Mariestad
Norrkoping
Linkoping
Lidkoping
Wenersborg
Uddevalla
Trollhatta Falls
Lake Wener
Lake Wetter
Sommen L.
Jonkoping
Nassjo
Boras
Gothenburg
Westervik
Wisby
Windau
Hemse
Ocarhamn
Borgholm
Hoburg
Wexio
Kalmar
Halmstad
Hessleholm
Helsingborg
Karlskrona
Christianstad
Landskrona
Lund
Cimbrishamn
Malmo
Ystad
Ronne
Hernosand
Sundsvall
Ostersund
Bergejo
Delen L.
Hudiksvall
Soderhamn
Bjorneborg
Tammerfors
Nasi L.
Paijaune L.
Abo
Helsingfors
Hango
Bomarsund
Nortelge
Port Baltic
Reval
Riga
Libau
Shavli
Memel
Tilsit
Konigsberg
Gulf of Danzig
Danzig
Stolp
GERMANY
HOLSTEIN
SCHLESWIG
Kalmar
Oland

It is estimated that $\frac{1}{38}$ of the area of N. lies within the region of perpetual snow, while elevations exceeding 2,000 ft. above sea-level are unfitted for human habitations, though for a portion of the brief summers, the herdsmen can occupy *sætre* or huts at elevations of 3,000 ft. and upward. A large extent of the mountain districts yields no produce beyond scanty grasses, mosses, lichens, and a few hardy berry-yielding plants. Only birch and juniper grow n. of 67°, which is the boundary of the pine. The Scotch Fir, *Pinus sylvestris* (Norwegian, *Furn*), and Spruce, *P. abies* (Norwegian, *Gran*), cover extensive tracts, and with birch, constitute the principal wealth of Norway. The hardier fruits, as strawberries, gooseberries, cherries, and raspberries, are abundant and excellent. Hemp, flax, rye, oats, and barley are grown as far n. as 66°; but though agriculture has been more systematically pursued of late years, the crops are not always sufficient for home consumption, and hence it is found absolutely necessary annually to import considerable quantities of corn and potatoes. The frugal peasantry do not, however, rely wholly on importation, but prepare a species of cake or bread from the bark of the pine when corn is scarce, and in plentiful years store away some of the produce of the harvest in the national corn-magazines, which are established in every part of N. for provision for an unfavorable season. Agriculture is most successful in the amt of Jarlsberg and Laurvik, and in the s. generally; while in the n., in the upper valleys, the rearing of cattle is an important industry. The herds and flocks are driven from the distant farms to the pasture-lands in these high mountain valleys, known as Sæterdale, where they remain till the approach of cold weather obliges the herdsmen to return with their charges to the shelter of the farms. Although the cattle and horses are small, they are generally strong and capable of bearing much hard labor.

Products, etc.—Fish are caught in almost every stream and lake of the interior, as well as in the fjords of the coast, and in the bays and channels which encircle the numerous islands skirting the long sea-line. Salmon, herring, and cod are of the greatest importance, and together give occupation to more than 50,000 men, who pursue the herring and cod fishing in the spring, and again in the summer, and the cod in the winter also. A large quantity of the fish caught does not appear in trade reports, being consumed by the fisher-folk and their neighbors. The value of the sea-fisheries of N. is nevertheless reckoned at more than $6,376,000 per annum. The quantities of dried fish, salt-fish, herrings, lobsters, fish-oil, and, recently, fish-guano, represent an enormous natural source of wealth. Norwegian ships also fish out of Norwegian waters, numbers going to the Jan Mayen seal-fisheries. Ice has of late become a marketable commodity, and a value of about $2,250,000 is annually exported to England. Next to the fisheries, N. derives its greatest wealth from the

produce of its woods, though forestry is not scientifically attended to. The w. coast has been almost wholly bared of timber by reckless cutting down, and the stormy climate renders the growth of young trees on the bare hillsides difficult and unsatisfactory. But great quantities of timber are still exported. Within the last few years, the Norwegian forests have yielded a new product of industry, known as wood-paste, extensively employed in the manufacture of paper.

The fauna of N. includes the bear, wolf, lynx, elk, otter, reindeer, red-deer, seal, the eider-duck and many other kinds of sea-fowl, blackcock, capercailzie, and a great variety of small-game. According to the census of domestic animals, there are in N. 998,819 sheep, 950,201 cattle, 214,594 goats, 172,999 horses, 165,348 swine, 108,784 reindeer.

The mineral products of N. are not of great commercial importance, but include iron, silver, copper, cobalt, chrome, nickel, and sulphur. The latter two have increased lately; the others, especially iron, have fallen off for lack of wood to work them with. The richest mines are in the s., chiefly in the dist. of the Glommen, e.g., the famous and ancient silver-works of Kongsberg, the copper mines of Röraas, Alten, and Vigsnæs, the nickel mines of Modum and Bamble, and the cobalt-works of Buskerud, and the numerous iron shafts on the s. declivities of the mountains between Kongsberg and the Glommen. Latterly, however, some productive copper-works have been opened in the n. districts of Kaafjord in Finmark.

Ship-building in all its branches is almost the only industrial art extensively and actively prosecuted. In many parts of the country there are absolutely no special trades, the inhabitants of the small fishing-ports, no less than the inmates of the widely separated farms, employing their compulsory leisure during the long winter in weaving, spinning, and making the articles of clothing required in their households.

Trades, etc.—The principal seats of trade are Christiania, Drammen, Arendal, Bergen, Stavanger, and Trondhjem. The merchant fleet numbers about 5,843 sailing vessels of 808,768 tons and 1,477 steamers of 642,657 tons. About 12,500 vessels clear the ports of N. yearly. The exports, mainly timber, fish, fish-oil, bar iron, copper ore, ice, furs, feathers, and down, averaged in value during the last decade about $41,400,000 a year, three-fourths of the whole value being for wood and timber, sawn or split. The imports during the same period ranged from $70,000,000 to $76,900,000. The American trade comparatively is small; exports to A. about $1,020,000; imports from A. $2,500,000 yearly. The most important commercial relations of N. are with Germany, Great Britain, Russia, and Denmark;

while the Rom. Cath. countries of the Mediterranean are the principal purchasers of smoked and dried fish.

Revenue, etc.—By the annual budgets, the revenue averages about $27,400,000, derived from customs, direct and indirect taxes, post-office, telegraphs, mines, railroads, and other state property. The national debt stands at over $61,300,000. The standard of value is gold; the *Krone* or crown (value 27 cents) is the unit coinage. The metric system is used.

Administration, etc.—N. is divided into 20 amts or administrative circles (see table previous). These circles are subdivided into 56 fogderier (bailiwicks), each presided over by a rural magistrate, and containing in all 446 herreder, or administrative districts, which have similarly their own judicial or official heads. N. has a representative govt., based on the constitution established 1814. There was a sharp and continued constitutional struggle 1880–84 as to the king's power of veto (see below). The Storthing, or legislative chamber, meets annually, and is composed of representatives elected by deputies who have been selected for the purpose of nominating the members. These deputies are elected by a system of almost unrestricted universal suffrage, the only qualifications necessary for every Norwegian citizen not a criminal, nor in foreign service, being attainment of the age of 25 years, five years' residence, and certain property qualifications—such as a public appointment, ownership or tenancy of land, or, in towns, ownership of property worth at least 600 kroner (about $160.80). The election of the deputies takes place every third year, when the electors meet in their respective parish churches, and choose deputies, whose number is in the proportion of 1 to 50 voters for towns, and 1 for 100 in rural districts. These deputies then select from their own body, or from among other eligible persons, the representatives for the Storthing, which is further subdivided into two distinct chambers, the Lagthing and Odelsthing, with the former of whom rests the framing of legislative and financial measures, and with the latter the power of accepting or rejecting them, and the right of taking cognizance of the conduct of the ministers, judges, and other officers of the state. The members of the Storthing receive an allowance for their time and travelling expenses during the session. The Storthing votes the taxes, which are collected by officers of the king of Sweden and N.; it proposes laws, which must be ratified by the king; but if they pass the Storthing three times, they acquire validity even without the king's sanction. Although N. constitutes one joint kingdom with Sweden in regard to succession, external policy, and diplomacy, it is in all other respects an independent state, having its own government, legislative machinery, finances, army, and navy. The king is indeed commander-in-chief of all the forces of the country, whether military or naval; but he can neither augment or decrease their number, nor proclaim

peace or war, without the assent of the Norwegian council of state, which must consist of ten members, natives of the country; nor, excepting in time of war, can he bring foreign soldiers within the frontiers, or send native troops out of Norway. In accordance with the constitution, no title can be conferred independently of the tenure of office, and no one can be raised to the rank of a noble; while with the death of the members of the few still surviving noble families who were born before 1821, all personal honors, privileges, and distinctions belonging to nobility will cease. The constitution may therefore be regarded as purely democratic in its character. The council of state constitutes the highest court of justice, under whose jurisdiction the provincial magistrates or *amtmaend* administer justice, in conjunction with the bailiffs and *sorenskriver* or advocates, who preside over petty rural courts. These lower courts are controlled by the *Stift* or diocesan courts of justice; while the latter are, in their turn, under the high court of appeal or *Höieste Ret*, at Christiania.

Religion, etc.—The Lutheran is the predominant church, to which all persons holding public offices of trust must belong, though freedom is allowed to all other, except Jesuits, and to Jews. It was only in 1851 that toleration was extended to the Jews, who had been forbidden to live in N. by the fundamental law. There are of course many pagans in the extreme n. among the Lapps. There are six bishops, at Christiania, Christiansand, Trondhjem, Bergen, Hamar, and Tromsö; 84 archdeaconries and 488 clerical districts. There are about 52,700 dissenters, including 1,970 Roman Catholics, 10,286 Methodists, 5,674 Baptists, 501 Mormons, 175 Quakers. The clergy, who receive tithes, exercise considerable influence in remote country districts, where they frequently are called to settle disputes, and exercise various judicial functions. Much has been done of late years in N. for the diffusion of knowledge, and provision is now made to extend education to the inhabitants of the most inaccessible districts by means of itinerant teachers, a certain number of whom, corresponding to the number of farms in each parish, are nominated to the office of schoolmaster. These men proceed from house to house, being supplied with a school-room, and fed and entertained by each householder in succession for the number of days at which the farm is mulcted; and by the aid of these means, education is so universally diffused that it is rare to meet with Norwegians who cannot read and write. Education is compulsory on children from the age of 6½ in town and 7 in the country till the age of 14. The University of Christiania (q.v.), founded 1811, has 50 professors, and is attended yearly by about 1,500 students.

Emigration.—For many years there has been extensive emigration from N., mainly to the United States: the

number of emigrants fluctuated from 3,206 in 1877 to 28,804 in 1882 and 5,642 in 1894.

Army and Navy.—By the laws of 1866, 1876, and 1885, the army of N. is composed of troops of the line, the military train, the militia or Landevaern, the civic guards, and the Landstorm: the force was reorganized (1887). The troops of the line are limited by the law to 18,000 men and 800 officers. Usually the troops of the line, with reserves, number 30,000 men and 900 officers. All young men above 22 years of age are liable to serve, except the inhabitants of the three northern amts of the kingdom. The fleet numbers some 59 vessels, of which 4 were modern armor-clads, 4 monitors, 37 torpedo-boats, besides small gunboats. The navy is manned by 400 sailors, but the number of men liable by law to be called upon for naval service in the maritime districts of N. exceeds 25,000. The chief fortress of N. is Oscarsborg; the fortresses Fredriksstad, Fredericksten, Carljohansvaern, Akershus in Christiania, Christiansand, Bergen, Trondhjem, and Vardöhus are of little importance.

The pop. of N. is largely rural, though about 23.7 per cent. live in towns. Christiania (or Kristiania), chief city and capital, has a pop. of 227,626; Bergen, 72,251; Trondhjem, 38,180. The physical character and consequent climatic relations of N. leave a very small proportion (according to some writers, only about 2 per cent.) of the area capable of being cultivated. The cultivators of the land are in most instances also the proprietors, less than one-third of the whole number being tenants only. Allodial land, known as Udal or Odel, does not descend to the eldest son unconditionally, since all his relatives have a claim upon it, and if it should be sold, have the right of buying it back within the term of five years at the sale-price.

Roads, Railways, etc.—The public roads in N. are excellent; and travelling is rendered cheap and expeditious by the system established and regulated by law, in accordance with which carriages and horses are provided at fixed rates of payment for travellers passing through the rural districts of the country. This system, known as 'Skyds,' is completely under the control and direction of the authorities, by whom the number of the guest-houses and stations is regulated. The length of state railways exceeds 1,329 miles; of private railways 219 miles; total 1,548 m. There are over 10,830 m. of telegraph and telephone service throughout N. utilizing 59,865 m. of wire. The postal service is equally well developed.

Race, Language, etc.—With the exception of about 20,000 Lapps and Finns, living in the remote n. regions, the inhabitants are generally a pure Scandinavian race, akin to the n. Germanic nations, of Aryan descent. The genuine Norwegians are of middle height, with well-knit, muscular frames, of fair skin,

with light flaxen or yellow hair, and blue eyes. In character, they may be said to be frank, yet cautious and reserved, honest, religious, and superstitious, more from an inveterate clinging to the forms, thoughts, and creed of their ancestors, than from fanaticism. Their love of country, and irrepressible fondness for the sea, by the very anomaly which these apparently contradictory propensities exhibit, show them true descendants of the sea-roving Northmen of old. Of late years, emigration has steadily increased at a rate which threatens serious evil to so thinly populated a country as N., but which is easily explained by the small portion of land capable of cultivation. The general diffusion of education, and the perfect equality and practical independence which they have known how to secure and retain for themselves, notwithstanding their nominal incorporation with the other Scandinavian kingdoms, give to the poorest Norwegians a sense of self-respect and self-reliance which distinguishes them favorably from those of the same class in other countries. The peasants, especially in the amts remote from towns, retain their ancient provincial costumes, which usually are highly picturesque, consisting, among the women, of ample woolen skirts and brightly colored knit bodices, fastened and adorned with silver or brass clasps and buckles. Music is much cultivated by all classes of the people, and the favorite national songs and melodies are mostly of a melancholy or at least plaintive character.

Danish is the language in ordinary use both in writing and in speaking, though dialects nearer akin to the old Norse are spoken by the dalesmen and mountaineers of special districts. Since the separation of the country from Denmark, a strongly national tendency has been manifested by some of the best Norwegian writers, and attempts have been made to reorganize these dialects into one general Norwegian language; thus, to revive the ancient Norse, or Icelandic, which has been preserved in Iceland in almost perfect purity since its first introduction to the island in the 9th c. by colonists from the Scandinavian mother-lands. Among the most zealous cultivators of the ancient and modern literature and history of N. are Prof. P. A. Munch, whose able expositions of the laws and social conditions of his country have thrown new light on its history; Keyser, Unger, and Hohnboe, who have done much to elucidate the Norse tongue and literature; A. Munch, Bjerregaard, Hansen, and Welhaven the critic, successful cultivators of the national lyric; J. Moe and Asbjörnsen, collectors and annotators of native sagas; Ibsen the dramatist, and Björnsen, delineator of national peasant-life. In the more abstruse departments of mathematical and physical science Norwegians have gained a foremost place, as is testified by names such as N. H. Abel, renowned for discoveries in definite integrals; C. Hansteen, astronomer; and Keilhau, geologist.

History.—The early history of N. is comprised in that of the other Scandinavian countries, and is, like theirs.

for the most part fabulous. It is only toward the close of the 10th c., when Christianity was introduced under the rule of Olaf I., that the mythical obscurity in which the annals of the kingdom had been previously plunged begins to give place to the light of historical truth.

The introduction of Christianity, which was the result of the intercourse which the Norwegians had with the more civilized parts of Europe through their maritime expeditions, destroyed much of the old nationality of the people with the heathenism which they had cherished, though the sanguinary feuds which had raged among the rival chiefs of the land did not immediately lose their ferocity under the sway of a milder religion. Olaf II., or the Saint (1015–30), who zealously prosecuted the conversion of his countrymen, raised himself to supreme power in the land by the subjection of the small kings or chieftains, who in the times of heathenism had subdivided the kingdom among them. The war between Olaf and King Knud the Great of Denmark, which terminated 1030 with the battle of Sticklestad, in which Olaf was slain, brought N. under the sway of the Danish conqueror; but at his death 1036, Olaf's son, Magnus I., recovered possession of the throne, and thenceforth, till 1319, N. continued to be governed by native kings. The death in that year of Hakon V., without male heirs, threw the election of a new king into the hands of the national assembly, which, after many discussions, made choice of Magnus VIII. of Sweden, son of Hakon's daughter. He was in turn succeeded by his son Hakon, and his grandson Olaf IV., who, having been elected king of Denmark 1376, became ruler of the sister Scandinavian kingdoms on the death of his father 1380. This young king, who exercised only a nominal sway under the guidance of his mother Queen Margaret, only child of Valdemar III. of Denmark, died without heirs 1387. Margaret's love of power and capacity for government brought about her election to the triple throne of the Scandinavian lands, and from this period, till 1814, N. continued united with Denmark; but while it shared in the general fortunes of the latter state, it retained its own constitutional mode of government, and exercised its right of electing to the throne, until, like the sister-kingdom, it agreed of its own free will to relinquish this privilege in favor of hereditary succession to the throne. See DENMARK (*History*). The Napoleonic crisis may be said to have severed this union, which had existed more than 400 years; for Denmark, after having given unequivocal proofs of adhesion to the cause of Bonaparte, was compelled, after the disastrous war of 1813, to purchase peace at the cost of this long-united partner of her state. Crippled in her resources, and almost a bankrupt, she saw herself constrained to sign the treaty of Kiel 1814, by which it was stipulated by the allied powers that she should resign N. to Sweden, receiving in return, by way of indemnity, some portion of Swedish Pomerania and the island of Rügen, which were subsequently exchanged

with Prussia for Lauenburg, on the payment by that state of two million rix-dollars. The Norwegians, having refused to admit the validity of the treaty of Kiel, nominated Prince Christian, heir-presumptive to the throne of Denmark, regent and subsequently king of Norway. This nomination was made by the national diet, or Storthing, which met at Ejdsvold, where they drew up a constitution based on the French constitution of 1791. These measures found, however, neither supporters nor sympathizers among the other nations; and with the sanction of the great allied powers, Charles John Bernadotte, Crown-Prince of Sweden, led an army into N., and, after taking Frederickstad and Frederickshald, threatened Christiania. Denmark being unable to support the cause of Prince Christian, and N. being utterly destitute of the means necessary for prosecuting a war, resistance was of no avail, and the Norwegians, in this untoward conjuncture of affairs, were glad to accept the proposals made to them by the Swedish king for a union with Sweden, on the understanding that they should retain the newly promulgated constitution, and enjoy full liberty within their own boundaries. These conditions were agreed to, and strictly maintained; a few unimportant alterations in the constitution, necessitated by the altered conditions of the new union, being the only changes introduced in the machinery of government. Charles XIII. was declared joint king of Sweden and N. 1818. After the union, N. firmly resisted every attempt on the part of the Swedish monarchs to infringe on the constitutional prerogatives of the nation; and during the reign of the first of the Bernadotte dynasty, the relations between him and his Norwegian subjects were marked by jealousy and distrust on both sides. In 1905 the long-smouldering embers of discontent between the two nations were fanned into a destructive flame over the refusal of King Oscar to ratify the demand of Norway for a separate consular service, and the Storthing on June 7 passed a resolution for the dissolution of the union, which after a period of strained relations, was effected by the ratification of the Treaty of Karlstad on Oct. 16, in which Sweden recognized the independence of Norway. On Nov. 15 a plebiscite elected Prince Karl of Denmark King of Norway as Haakon VII. (q.v.) by 257,710 votes against 68,852 votes polled by the republican party.

NOR'WAY HAD'DOCK: see BERGYLT.

NORWEGIAN, n. *nŏr-wē'jĭ-ăn:* a native of Norway: ADJ. pertaining to Norway.

NORWEGIUM, n. *nŏr-wē'jĭ-ŭm* [NL. *Norwegia*, Norway], (symbol Ng.): new metal not yet fully described and accepted as a chemical element.

NORWICH.

NORWICH, *nawr'wich:* city and railroad centre, one of the two caps. of New London co., Conn., at the head of the Thames river (formed by junction of the Shetucket and Yantic), 15 m. from Long Island Sound; lat. 41° 32′ n., long. 72° 4′ w.; 13 m. from New London, the other cap. of the co., 35 m. s.e. of Hartford, 48 m. e. by n. from New Haven, 76 m. s.e. from Boston; on the New London Northern and the New York and New England railroads; also has the Norwich and Worcester railroad, connecting, for travel from Boston, with a daily (evening) line of steamers to New York. The channel of the Thames gives 2,000 ft. of dockage with 12 ft. depth of water, 2,000 ft. with 8 ft. depth, and 4,000 ft. with 6 or 7 ft. depth. The rise and fall of the tide is 3 ft. The site of N. is that of the valleys of the rivers forming the Thames, for its business portion; and for very fine residence quarters the plateau or series of terraces rising between the valleys, and giving a charming prospect down the valley of the Thames. The town, beyond the city limits, lies in a pleasant valley surrounded by hills. The rivers furnish very abundant water-power, the falls of the Yantic in particular giving a natural dam 50 ft. high, about which a manufacturing centre has grown. The original town was a tract of 9 sq. m. bought from the Mohegan Indians 1659, June 6, by a party from Saybrook, under Capt. John Mason and the Rev. James Fitch. The settlement was made 1660, and the town named after the English (Norfolk co.) home of Capt. Mason. The commerce of N. was of importance from 1760, was enriched by privateering 1781–2, showed a tonnage of 4,312 tons 1795, and steadily grew until the war between France and England 1803; then the embargo, and finally the war of 1812–15, ruined it. Before 1800, manufactures had sprung up—iron cutlery, oil, iron wire, paper, stockings, and clocks; and from 1812 dated cotton-mills, woolen-mills, nail factory, and cork-cutting. At present its cotton, woolen, and paper mills are unsurpassed in the United States; and machinery, fire-arms, printing-presses, wood type, bar iron, envelope-making machines, and wood-working machinery are manufactures for which it is notable.

N. was one of five towns of Conn. to which city charters were granted by the legislature of 1784. The present charter dates from 1871. The chief public buildings are the court-house, used by the city, town, and county, the Free Academy, built and endowed (1856) at a cost of $110,000, and one of the best college preparatory schools in New England, and the Park (Congl.) and Christ (Prot. Episc.) churches. There are excellent graded schools, high school, public library and free reading-room, an old ladies' home, and about 20 churches. N. has 5 national banks, with capital aggregating $1,700,000; total resources and liabilities $6,847,362; and three savings banks, with over $11,000,000 deposits.

N. has more than 40 m. of streets, many beautifully shaded with trees, water-works owned by the city, gas and electric lights furnished by private corporations,

electric street railroads, three parks and nine cemeteries. The Indian burial ground containing the grave of Uncas, and the place where Miantonomoh fell, are particular points of interest. Pop. (1910) 20,367.

NOR'WICH: county seat of Chenango co., N. Y.; in a fertile valley on the Chenango river and Chenango canal; 216 m. n.w. of New York, 90 m. w. of Albany. It is on the Delaware Lackawanna and Western railroad, and is the s.e. terminus of the New York and Oswego Midland railroad. N. is an attractive town, and has churches, handsome stone court-house, academy, graded schools, free library, etc.; blast furnaces, railroad shops, and manufactures of furniture, ribbons, gloves, perfumes, drugs, etc. Pop. (1910) 7,422.

NORWICH, *nawr'ĭch* or *nawr'rĭj*: city of England, cap. of the county of Norfolk, and a county in itself; on the Wensum, immediately above its confluence with the Yare; 20 m. w. of Yarmouth and 114 m. n.n.e. of London. It covers an area about 5 m. in circumference, is skirted on its n. and e. sides by the river, and on the w. and s. it was formerly surrounded by walls, the last vestiges of which have been recently removed to make room for the extension of the city. In the market-place (600 ft. long by 340 ft. wide) and its vicinity are many large shops and good houses. The castle, finely situated on an elevation near the centre of the town, originally covered, with its works, about 23 acres; its bridge (150 ft. long) over the ditch has one of the largest and most perfect Anglo-Norman arches remaining. The massive quadrangular Norman keep is now used as a prison. The cathedral, almost wholly Norman in plan, founded 1094 by Bp. Herbert Losinga, is 411 ft. long, 191 ft. broad at the transepts, and is surmounted by a spire 315 ft. high. Near the cathedral are a number of ancient and interesting structures now more or less in ruins, among which are St. Ethelbert's and the Erpingham Gate, the former in Decorated English, the latter in late Perpendicular, both valuable and rich specimens of their styles. Besides many dissenting chapels and other places of worship, there are about 40 churches, notable among which are St. Peter's, Mancroft, a handsome cruciform edifice of the 15th c., with a remarkably fine peal of 12 bells; St. Andrew's, St. Clement's, St. George's, St. Giles', St. Michael's. The Free Grammar School (endowment about £200 a year) was founded by Edward VI.; and the other educational establishments are numerous and various. The public library contains 50,000 vols., and the library of the Norwich Literary Institution 26,000 vols. N. is the seat of extensive and flourishing manufactures, the chief of which are mustard, starch, bandannas, bombazines, shawls, damasks, camlets, and muslins; shoemaking is extensively carried on; yarn and silk mills are in operation, and employ many hands. Iron-founding, tanning, dyeing, malting, etc., and agricultural-

implement making are among the industries. The trade is chiefly in agricultural produce and coal. N. is the see of a bishop. Pop. (1891) 100,964; (1901) 111,728.

About three miles s. of N. is Castor St. Edmunds, which, prior to the Roman era, was called Caister, and under the Romans received the name *Venta Icenorum*. N. occupies a place in history from the time of the earlier Danish invasions. It had its origin in the castle erected as a stronghold by the East Anglian kings, and resorted to as a place of safety by the inhabitants of *Venta Icenorum*, who gave it the name of North-wic, or northern station or town, on account of its relative position with respect to their own town. The bishopric of the East Angles was removed hither 1094. About 4,000 Flemings settled at N. in the reign of Elizabeth, and greatly increased the prosperity of the town by the branches of manufacture which they introduced.

NOR'WICH (or MAMMALIF'EROUS) CRAG: series of highly fossiliferous beds of sand, loam, and gravel, of Pleistocene age, occurring at several places within a few miles of Norwich, England, where they are popularly named 'Crag.' They contain a mixture of marine and fresh-water mollusca, with ichthyolites and bones of mammalia. They are evidently estuary beds, the most common shells being the very species now abundant in such situations around the coasts of Britain; but with them are associated a few extinct species. The beds rest on the white chalk, the surface of which is frequently perforated by *Pholas crispata*, the shell still remaining at the bottom of the cavity. The mammalian bones belong to species of elephant, horse, pig, deer, and field-mouse. With them are occasionally found bones of *Mastodon angustidens* and some mollusca, which belong to the Red Crag. Their occurrence here is believed to have arisen from their having been washed out of the Red, into this, the Norwich Crag.

NORWOOD, *nawr'wûd*, UPPER and LOWER: two villages in Surrey, England, with a station on the London and Croydon railway, 6 m. s. of London. The villages are worthy of mention chiefly for their schools, among which are a district school for the pauper children of Lambeth parish and a very large and important educational establishment for the pauper children of London.

NORWOOD: city of Hamilton co. Ohio, a northeastern suburb of Cincinnati, connected by the Baltimore and Ohio Southwestern railroad and local steam and electric railroads. It occupies a beautiful location, and has fine modern factories, producing electrical fittings, elastic bookcases, playing cards, washing machines, and other specialties; municipal waterworks and electric lighting plant. Settled 1790, incorporated as a village 1888, as a city 1902. Pop. (1910) 16,185.

NOSE, n. *nōz* [AS. *næse;* Ger. *nase;* L. *nāsus;* Lith. *nosis;* Russ. *nos'*, a nose]: the prominent part of the face in which is the sense of smell; a snout; a nozzle; scent (see below): V. in *OE.*, to scent; to smell; to look big; to bluster. NOSED, pp. *nōzd:* ADJ. having a nose. NOSELESS, a. *nōz'lĕs*, destitute of a nose. NOSE-BAG, a bag containing food to be attached to a horse's head. NOSE-BAND, part of a bridle. NOSE-RING (see RING). NOSING, n. *nōz'ĭng*, in *arch.*, the projecting edge of a molding or dip, principally on the edge of a step in a stair. TO LEAD BY THE NOSE, to lead blindly or unresistingly, applied *figuratively* to the will and actions of another. TO HAVE ONE'S NOSE ON THE GRINDSTONE, to be oppressed, as by exactions. TO THRUST ONE'S NOSE INTO, to interfere with in a meddlesome manner. LENGTH OF ONE'S NOSE, as far as one can see at the first view. TO TURN UP THE NOSE, to show contempt; to exhibit silly pride. UNDER ONE'S NOSE, under the immediate range of observation.

NOSEAN, n. *nōz'ăn* [after the discoverer, K. W. *Nose*]: a mineral, a silicate of alumina and soda, allied to *hauyne*, occurring in many rocks.

NOSEGAY, n. *nōz'gā* [*nose*, and *gay*]: a bunch of gay, pleasant-smelling flowers; a bouquet.

NOSE; AND THE SENSE OF SMELL: one of the features of the face; and the special bodily sense of which it is the organ. The nose is not only the organ of smell, but is likewise a part of the apparatus of respiration and voice. Considered anatomically, it may be divided into an external part—the projecting portion, to which the term *nose* is popularly restricted; and an internal part, consisting of two chief cavities, or *nasal fossæ*, separated from one another by a vertical septum, and subdivided by spongy or turbinated bones projecting from the outer wall into three passages or *meatuses*, with which various cells or *sinuses* in the ethmoid, sphenoid, frontal, and superior maxillary bones communicate by narrow apertures.

The external portion of this organ may be described as a triangular pyramid which projects from the centre of the face, immediately above the upper lip. Its summit or root is connected with the forehead by a narrow bridge, formed on either side by the nasal bone and the nasal process of the superior maxillary bone. Its lower part presents two horizontal elliptical openings, the *nostrils*, which overhang the mouth, and are separated from one another by a vertical septum. The margins of the nostrils are usually provided with a number of stiff hairs (*vibrissæ*), which project across the openings, and serve to arrest the passage of foreign substances, such as dust, small insects, etc., which might otherwise be drawn up with the current of air intended for respiration. The skeleton or framework of the N. is composed partly of the bones forming the top and sides of the bridge and partly of cartilages, there being on either side an upper lateral and a lower lateral cartilage, to the latter of which

are attached three or four small cartilaginous plates, termed sesamoid cartilages; there is also the cartilage of the septum, which separates the nostrils, and, in association posteriorly with the perpendicular plate of the ethmoid, and with the vomer, forms a complete partition between the right and left nasal fossæ. It is the lower lateral, termed by some writers the alar, cartilage, which by its flexibility and curved shape forms the dilatable chamber just within the nostril. The nasal cartilages are capable of being slightly moved, and the nostrils of being dilated or contracted by various small muscles. The integument of the N. is studded with the openings of sebaceous follicles, which are extremely large and abundant in this region. The oleaginous secretion of these follicles often becomes of a dark color near the surface; hence the spotted appearance which the tip and lower parts of

Fig. 1.—A Longitudinal Section of the Nasal Fossæ of the Left Side, the Central Septum being removed:

1, the frontal bone; 2, the nasal bone; 3, part of the ethmoid bone; 4, the sphenoidal sinus. *a*, the superior turbinated bone; *b*, the superior meatus; *c*, the middle turbinated bone; *dd*, the middle meatus; *e*, the inferior turbinated bone; *ff*, the inferior meatus; *gg*, a probe passed into the nasal duct.

the sides, or *alæ*, of the nose frequently present. On firmly compressing or pinching the skin of these parts, the inspissated secretion is forced out of the follicles in the semblance of minute white worms with black heads.

The *nasal fossæ*, which constitute the internal part of the N. are lofty and of considerable depth. They open in front by the nostrils; behind they terminate by a vertical slit on either side in the upper part of the pharynx, above the soft palate, and near the orifices of the Eustachian tubes which proceed to the tympanic cavity of the ear.

The mucous membrane lining the N. and its cavities is called *pituitary* (Lat. *pituita*, slime, rheum), from the nature of its secretion, or *Schneiderian*, from Schneider, the first anatomist who showed that the secretion proceeded from the mucous membrane, and not, as was pre

viously imagined, from the brain; it is continuous with the skin of the face at the nostrils, with the mucous covering of the eye through the lachrymal duct (see EYE), and with that of the pharynx and middle ear posteriorly. This membrane varies in its structure in different parts of the organ. On the septum and spongy bones bounding the direct passage from the nostrils to the throat, the lining membrane is comparatively thick, partly in consequence of a multitude of glands being arranged beneath it and opening upon it, but chiefly, perhaps, from the presence of ample and capacious submucous plexuses of both arteries and veins, of which the latter are by far the more large and tortuous. These plexuses, lying in a region exposed more than any other to external cooling influences, appear designed to promote the warmth of the part, and to elevate the temperature of the air on its passage to the lungs. Their presence explains the tendency to hemorrhage from the N. in general or local plethora. In the vicinity of the nostrils, the mucous membrane exhibits papillæ and a scaly epithelium, like the corresponding parts of the skin. In the sinuses, and in all the lower region of the N., the epithelium is of extreme delicacy, being of the columnar variety, and clothed with cilia. In the upper third of the N.—which, as the proper seat of the sense of smell, may be termed the *olfactory region*—the epithelium ceases to be ciliated, assumes a more or less rich sienna-brown tint, and increases remarkably in thickness, so that it forms an opaque soft pulp upon the surface. It is composed of an aggregation of nucleated particles, of nearly uniform appearance throughout, except that the lowest are of a darker color than the rest, from their containing a brown pigment in their interior. Dr. Todd and Mr. Bowman remark, in their *Physiological Anatomy*, from which is condensed the above account of the nasal mucous membrane, that the olfactory region abounds in glands, apparently identical with sweat glands, which dip down in the recesses of the submucous tissue among the ramifications of the olfactory nerve.

The nerves of the N. are the first pair or olfactory, which are specially connected with the sense of smell, branches of the fifth pair, which confer ordinary sensibility on its skin and mucous membrane, and motor filaments, from the facial nerve to the nasal muscles. The olfactory nerve on each side is connected with the inferior surface of the Brain (q.v.) by an external, a middle, and an internal root, which unite and form a flat band (more correctly, a prism), which, on reaching the cribriform plate of the ethmoid bone, expands into an oblong mass of grayish-white substance, the *olfactory bulb*. From the lower surface of this bulb are given off the *olfactory filaments*, 15 or 20, which pass through the cribriform foramina, and are distributed to the mucous membrane of the olfactory region. These filaments differ essentially from the ordinary cerebral nerves. They contain no white substance of Schwann, are not divisible

into elementary fibulæ, and resemble the gelatinous fibres in being nucleated and of finely granular texture. The branches of the fifth pair (or trifacial) given to the N. are the nasal nerve (derived from the ophthalmic division), which supplies the skin and mucous membrane in the vicinity of the nostrils, and the naso-palatine nerve (de-

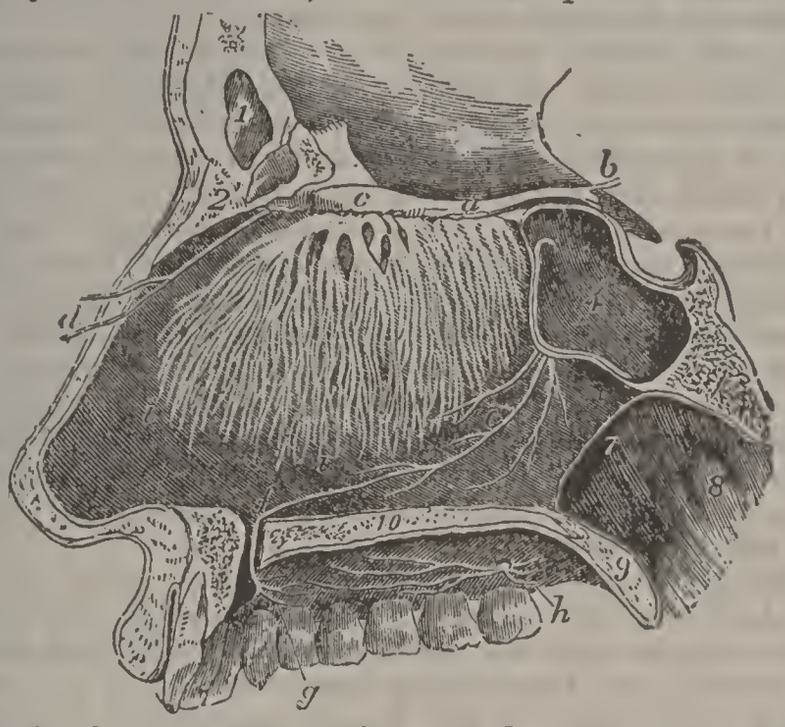

Fig. 2.—The Distribution of the Olfactory Nerve on the Septum of the Nose:

1, the frontal sinus; 2, the nasal bone; 4, the sphenoidal sinus of left side; 7, the posterior opening of the left nostril; 8, the opening of the Eustachian tube; 9, a section of the soft palate; 10, a section of the hard palate. *a*, the olfactory nerve; *b*, its three roots; *c*, its bulb, from which filaments proceed downward through the cribriform plate of the ethmoid; *d*, the nasal branch from the ophthalmic division of the fifth nerve; *e*, the naso-palatine nerve from the spheno-palatine ganglion; *g*, *h*, its branches; *i*, the septum of the nose.

rived from Meckel's ganglion, connected with the superior maxillary division), which nerve supplies the mucous membrane on the spongy bones and on the septum. The peculiar sensation that precedes sneezing is an affection of the nasal nerve; and the flow of tears that accompanies a severe fit of sneezing is explained by the common source of this and the lachrymal nerve; while the common sensibility of the N., generally, is due to the branches of this and of the naso-palatine nerve.

The nature of odorous emanations is so little known, that it is impossible to give a definite account of the mode in which they produce sensory impressions. From the fact that odorous substances are usually volatile, and *vice versâ*, it may be presumed that they consist of particles of extreme minuteness dissolved in the air; yet the most delicate experiments have failed to discover any loss of weight in musk and other strongly odorous substances after they have been freely evolving their effluvia for several years. But whatever may be the nature of the odorous matter, it is necessary that it should be transmitted by a respiratory current through the nostrils to

the true olfactory region, whose membrane must be in healthy condition. If the membrane is too dry, or if there is an inordinate excretion of fluid from its surface (both of which conditions may occur in catarrh or cold in the head), smell is impaired or lost, in consequence of the necessary penetration of the stimulating odor to the nervous filaments being prevented.

The acuteness of the sense of smell is far greater in many of the lower animals (e.g., dogs) than in man, and they employ it in guiding them to their food, in warning them of approaching danger, and for other purposes. To civilized man its utility is less, but it is occasionally much increased when other senses are deficient. In the well-known case of James Mitchell, deaf and blind from his birth, it was the principal means of distinguishing persons, and enabled him at once to perceive the approach of a stranger. Among many savage tribes, the sense of smell is almost as acute as in many of the lower mammals—e.g., the Peruvian Indians are able, according to Humboldt, to distinguish, in the middle of the night, whether an approaching stranger is a European, American Indian, or negro.

Although all poisonous gases are not odorous, and all bad odors may not be positively deleterious, doubtless one of the principal uses of the sense of smell is to detect atmospheric impurities, many of which are most noxious, giving rise to very dangerous forms of fever.

NOSOGRAPHY, n. *nō-sŏg′ră-fĭ* [Gr. *nosos*, disease; *graphō*, I write]: the scientific description of diseases.

NOSOLOGY, n. *nō-sŏl′ŏ-jĭ* [Gr. *nosos*, disease; *logos*, discourse]: systematic arrangement and classification of diseases of plants and animals; the doctrine of diseases; a branch of the science of medicine. NOSOLOGICAL, a. *nŏs′ŏ-lŏj′ĭ-kăl*, pertaining to. NOSOL′OGIST, n. *-jĭst*, one who classifies diseases.—*Nosology* has been presented at various times under different systems—some based on the nature of the ascertained causes of diseases; others on the pathological states or conditions which attend diseases; others on the differences between structural and functional diseases, etc. It is difficult to decide on the best method; but that of Dr. Farr, one of the most distinguished living medical statists, adopted by the English registrar-gen. in reports on the mortality of London and England, is becoming more generally adopted than any other. It has the advantage over the formerly popular, now antiquated, system of Cullen (1792), of meeting the requirements of modern science, and (by illustrating great questions connected with public health) of showing and aiding to remove those causes that are injurious or fatal to life, e.g., bad drainage, imperfect ventilation, etc.

Dr. Farr's system of N. is arranged in four primary classes, each including various orders:

CLASS I. ZYMOTIC DISEASES [Gr. *zymē*, ferment].—Diseases epidemic, endemic, or contagious, and induced

by some specific body, or by want of food, or by its bad quality. In this class are four orders—viz., Order I *Miasmatic Diseases* [Gr. *miasma*, stain], e.g., small-pox, measles, scarlet-fever, diphtheria, typhus and typhoid fevers, cholera, ague, etc. Order II. *Enthetic Diseases* [Gr. *enthĕtos*, put in or implanted], e.g., syphilis, gonorrhœa, glanders, hydrophobia, malignant pustule, etc. Order III. *Dietic Diseases* [Gr. *diaita*, way of life or diet], e.g., famine, fever, scurvy, purpura, rickets, bronchocele, delirium tremens, etc. Order IV. *Parasitic Diseases*, e.g., scabies (or itch), and worm disorders from animal parasites, and ring-worm, scald-head, etc., from vegetable parasites or fungi.

Class II. Constitutional Diseases.—Diseases affecting several organs, in which new morbid products are often deposited; sometimes hereditary. This class contains two orders—Order I. *Diathetic Diseases* [Gr. *diathĕsis*, condition or constitution], including gout, anæmia, cancer, melanosis, lupus, etc. Order II. *Tubercular Diseases*, e.g., scrofula, phthisis, mesenteric disease, tubercular meningitis, etc.

Class III. Local Diseases.—Diseases in which the functions of particular organs or systems are disturbed or obliterated, with or without inflammation; sometimes hereditary. This class includes eight orders—Order I. *Brain Diseases* (more correctly, *Diseases of the Nervous System*), e.g., apoplexy, paralysis, epilepsy, chorea, hysteria, mania, etc. Order II. *Heart Diseases* (more correctly, *Diseases of the Circulatory System*), e.g., pericarditis, endocarditis, aneurism, angina pectoris, atheroma, phlebitis, varicose veins, etc. Order III. *Lung Diseases* (more correctly, *Diseases of the Respiratory System*), e.g., bronchitis, pneumonia, pleurisy, asthma, empyema, laryngitis, etc. Order IV. *Bowel Diseases* (more correctly, *Diseases of the Digestive System*), e.g., stomatitis, gastritis, enteritis, peritonitis, jaundice, etc. Order V. *Kidney Diseases*, e.g., Bright's disease, nephritis, ischuria, diabetes, stone, gravel, etc. Order VI. *Genetic Diseases* (or *Diseases of the Generative System*), e.g., hydrocele, ovarian dropsy, etc. Order VII. *Bone and Muscle Diseases*, e.g., caries, necrosis, exostosis, synovitis, muscular atrophy, etc. Order VIII. *Skin Diseases*, e.g., urticaria, eczema, herpes, impetigo, acne, lichen, prurigo, etc.

Class IV. Developmental Diseases.—Special diseases, incidental result of the formative, reproductive, and nutritive processes. It contains four orders. Order I. *Developmental Diseases of Children*, e.g., malformations, idiocy, teething, etc. Order II. *Developmental Diseases of Women*, e.g., amenorrhœa, child-birth, change of life, etc. Order III. *Developmental Diseases of Old People*, e.g. old age and its concomitant affections. Order IV. *Diseases of Nutrition*, e.g., atrophy, debility, etc.

NOSOPHYTA, n. *nō-sŏf'ĭ-tă* [Gr. *nosos*, disease; *phuton*, a plant]: a disease caused by the growth or development of such parasitic plants as fungi, in an animal tissue.

NOSSAIRIANS, or Nusairieh (Ar. *Nossairiun*, Nazarean): Moslem sect, founded by Hakem, and a branch of the Shiites (q.v.), followers of Ali, a sect said to have originated, like the Druses, from the Ismaïlis and Karmathians. The N. sect was otherwise termed Nozaïte, Nosaïris, Nusairieh. They believed that the Divinity was united with certain prophets, particularly Ali and Mohammed-ben-Hanisiah—a doctrine abhorred by other Moslems, who regard it as derived from the Christians. Hamza (Hamzah?—a prophet of the time of the caliph Hakem, 10th c.) accused the N. of belief in metempsychosis, and of teaching that all things are lawful to believers—murder, theft, fornication, falsehood; and of practicing the same. Of Hamza himself the Druses make a divinity and the true Messiah.

NOSSI-BÉ, *nos-sē-bā′*, or Nossi-Barin, or Variou-Bé: island on the n.w. coast of Madagascar, at the mouth of the Bay of Passandava, separated from the mainland by a narrow channel; nearly 750 sq. m. Its coast-line is very much indented, and its surface much diversified. The highest hill is 1,486 ft. above sea-level, clothed to the summit with magnificent trees; but much of the island has a bare aspect. The soil is very fertile, and rice, maize, manioc, bananas, etc., are produced far beyond the wants of the inhabitants. The soil is volcanic, and there are several old craters filled with water. Nossi-Bé has been in the hands of the French since 1840, and when Madagascar became a French possession in 1896, was placed under the administration of the Governor-General. The small town Hellville, named from De Hell, French gov. of Réunion, with a harbor sheltered from n. and e. winds, is the chief town (pop. 1,500). There is good anchorage also at several other parts of the coast. Trade is mainly with Madagascar; imports yearly about $280,000 in value, exports about $400,000. Pop. of island, mostly Sakalavas, varying at different seasons, 9,500.

NOSSI-IBRAHIM, *nos′sē-ĭb-rȧ-hēm′*, or Sainte Marie, *sănt mȧ-rē′*: island on the e. coast of Madagascar, separated by a strait about 5 m. in width; a French possession; length about 40 m. from n.n.e. to s.s.w., breadth only a few m. It has been in French hands since 1750, and is prized as their chief place of commerce on that coast. The soil is generally arid, and the climate moist and unhealthful. Rain is extremely frequent. A small town called Saint Louis is a seaport, and fortified. All the French possessions on the coast of Madagascar were placed by imperial decree 1851 under one govt., that of the Comoro Isles (q.v.). Pop. of the island about 5,000.

NOSTALGIA, n. *nŏs-tăl′jĭ-ȧ* [Gr. *nostos*, return, especially home; *algos*, pain]: home-sickness; a vehement desire to revisit home. Nostal′gic, a. *-jĭk*, pertaining to.

NOSTISM, n. *nŏs′tĭzm* [L. *nos*, we]: a term used to designate the undue employment of the editorial *we* of newspaper-leader writers; a convenient plu. form of *egoism*.

NOSTOC, n. *nŏs′tŏk* [uncertain]: genus of plants of nat. order *Algæ*, suborder *Confervaceæ*, found upon moist ground, rocks near streams, etc., and consisting of an olive-colored, somewhat gelatinous hollow tumid frond, filled with simple filaments resembling strings of beads. *N. commune* is found sometimes springing up suddenly on gravel-walks and pasture-grounds after rain. It is a trembling gelatinous mass, often called STAR JELLY, and vulgarly regarded, owing to the suddenness with which it makes its appearance, as having fallen from the skies, and as possessed of important medicinal virtues. *N. edule* is used in China as food. NOSTOCHINEÆ, n. plu. *nŏs′tō-kĭn′ē-ē*, a suborder of Algæ, composed of moving filaments immersed in a gelatinous matter.

NOSTRADAMUS, *nŏs-tra-dā′mŭs* (proper name Michel de Notre-Dame, *dĕh nō′tr-dâm′*): noted astrologer: 1503, Dec. 13—1566, July 2; b. St. Remy, in Provence; of Jewish descent. He studied first at the Collége d'Avignon, where he showed remarkable scientific powers, and subsequently attended the celebrated school of medicine at Montpellier. Here he acquired distinction during an epidemic that desolated s. France, by his humane attentions to those stricken by the pestilence. After taking his degree, he acted as professor, but was induced by his friend J. C. Scaliger to settle in Agen as medical practitioner. After travelling, he settled at Salon, a little town in the environs of Aix, about 1544. Already he must have had repute, for in the following year, when an epidemic was raging at Lyon, he was solemnly invited thither by the civic authorities, and is said to have rendered immense services. He began his prophetic vein about 1547, though in what light he himself regarded his pretensions is not known; but he commenced to write his famous predictions (*Prophéties*), pub. Lyon 1555. These predictions were in rhymed quatrains, divided into centuries, of which there were seven; the 2d ed., 1558, contained ten. Astrology was then the fashion, and these quatrains, expressed generally in obscure and enigmatical terms, had great success. Some, indeed, regarded the author as a quack, but the great majority as a genuine seer or predictor of the future. He was, consequently, much sought after by all sorts of people, high and low. Catharine de' Medicis invited him to visit her at Blois, to draw the horoscope of her sons, and on his departure loaded him with presents. The Duke and Duchess of Savoy went to Salon expressly to see him; and when Charles IX. became king, he appointed N. his physician-in-ordinary (1564). He died at Salon. N.'s predictions have been the subject of an immense illustrative and controversial literature. They were condemned by the papal court 1781, being charged

with predicting the fall of the papacy. He wrote also an Almanac, which served as the model of all subsequent ones containing predictions about the weather.—See Jaubert's *Vie de M. Nostradamus, Apologie et Histoire* (Amst. 1656); Astruc's *Mémoires pour servir à l'Histoire de la Faculté de Montpellier* (Paris 1767); *Apologie pour les Grands Hommes Soupçonnés de Magie* (Paris 1825); and E. Bareste's *Nostradamus* (Paris 1842).

NOSTRIL, n. *nŏs'trĭl;* usually in the plu., NOSTRILS, *-trĭlz* [AS. *nas-thyrla*, nostrils—from *næse*, the nose; *thyrel*, an aperture]: one of the two apertures of the nose which give passage to air and to the secretions of the nose. DISEASES OF THE NOSTRILS, affections various in origin and form. Acute inflammation of the nasal mucous membrane, or *Coryza* (cold in the head), is a frequent affection (see CATARRH); and the chronic form of inflammation is known as OZENA (q.v.). Hemorrhage from the nostrils, or *Epistaxis* [Gr. a dropping], is by far the commonest form of bleeding from a mucous membrane. It may be produced: 1. By direct injury, e.g., a blow on the nose, or a scratch in the interior of the nostrils; or 2. It may be an *active* hemorrhage, in which case it is often preceded by a feeling of tension and heat in the nostrils, pain in the forehead, giddiness, buzzing in the ears, and flushing of the face (these symptoms are, however, seldom all present in the same case, and frequently the flow of blood is preceded by no apparent disorder); or 3. It may be *passive*, due either to a morbid condition of the blood, as in malignant scarlatina, typhoid and typhus fevers, scurvy, purpura, etc., or to obstruction of the circulation by disease of the liver and heart.

If the hemorrhage occur in a flushed plethoric subject, and is obviously *active*, it may be regarded as a salutary effort of nature, whose spontaneous cessation may be awaited; but if it continue so long as materially to weaken the patient, or if it be *passive*, or if it arise from injury, then means should be taken to stop it with as little delay as possible. The patient should be placed in the sitting posture at an open window, with the head erect or slightly inclined backward; and among the simpler means first to be tried are compression of the nostrils by the fingers, the application of a key or other piece of cold metal to the back of the neck, and the occasional immersion of the face or whole head in cold water, especially if accompanied by a drawing-up of the water into the nostrils; or Dr. Negrier's plan of causing the patient, in a standing position, suddenly to raise his arms straight upward, and to retain them for a short time in this position—a remedy which he states to have always succeeded, even in very bad cases, when other means had failed. Should these means fail, recourse must be had to astringent injections (e.g., 20 grains of alum dissolved in an ounce of water) thrown up the nostrils by a syringe; or to astringent powders (e.g., finely powdered galls, kino, matico, alum, etc.) blown up the

nostrils by means of a quill or other tube, or snuffed up by the patient. As a final resource, direct compression must be applied. Abernethy never failed in stopping the bleeding by winding a piece of moistened lint around a probe, so as to form a cylindrical plug, passing this along the floor of the nose for its entire length, then carefully withdrawing the probe, and allowing the lint to remain for three or four days. Cases occasionally occur in which it is necessary also to plug the posterior orifices of the nostrils by surgical operation.

Polypus (old term for any sort of pedunculated tumor firmly adhering—lit. 'by many feet'—to a mucous surface) is of common occurrence in the nostrils; its most usual seat of attachment being one of the turbinated bones. The ordinary kind is of the consistence of jelly, yellowish, streaked with blood-vessels, and of pear-shaped form. The patient has a constant feeling of fulness in the nostril, as if he had a cold in the head; he cannot effectually blow his nose; and his voice is sometimes rendered thick and indistinct. If he force his breath strongly through the affected nostril, and at the same time compress the other, and close the mouth, the polypus may generally be brought into view. The best treatment is to seize the neck or pedicle with the forceps and twist it off. The consequent hemorrhage may be readily checked by the means above described.

Foreign bodies are often inserted into the nostrils by children, and become impacted. They may usually be extracted by a small scoop or a bent probe. If they cannot be removed by these means, they must be pushed back into the throat through the posterior nares.

Children are occasionally born with imperforated nostrils. This congenital malformation may usually be remedied by surgical assistance.

NOSTRUM, n. *nŏs'trŭm* [L. *nostrum*, our own—from *nos*, we]: a quack medicine; a remedy the ingredients of which are kept secret.

NOT, ad. *nŏt* [AS. *naht*, naught, not: Ger. *nicht*, not—from the negative particle *ni*, and Goth. *vaihts;* AS. *wiht;* Ger. *wicht*, a whit, a thing]: a word which expresses denial or refusal. *Note.*—NOT is connected with NAUGHT, which see.

NOT, or N'OTE, v. *nŏt* [AS. *ne*, not; *wát* or *wot*, knew]: in *OE.*, know not; could not.

NOTABLE, a. *nō'tă-bl* [F. *notable*—from L. *notabĭlis*, distinguished, memorable—from *noto*, I designate or impress with a mark: It. *notabile*]: remarkable; worthy of notice; well known; *familiarly* applied to a woman, careful, thrifty. NO'TABLY, ad. *-blĭ*, in a notable manner; memorably; remarkably. NO'TABLENESS, n. *-bl-nĕs*, state or quality of being notable. NO'TABIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of being notable: a remarkable person or thing: a person of note.

NO'TABLES: name formerly given in France to persons of distinction and political importance. As the states-general were inconvenient to the despotism of the monarchy, the kings of the House of Valois adopted the expedient of calling in their stead *Assemblies of the Notables*, the time of calling them and the composition of them being dependent entirely on the pleasure of the crown, by which also all their proceedings were guided, so that they generally consented at once to whatever was proposed to them. They showed a particular readiness in granting subsidies, to which they themselves, as belonging to the privileged classes, were not to contribute. An assembly of N. convened in Paris by Richelieu 1626, and presided over by Gaston, brother of Louis XIII., consisted of only 35 members. For more than a century and a half, even this poor acknowledgment of any other mind or will in the nation than that of the sovereign was discontinued; but when the state of the finances brought the monarchy into difficulties and perils, Louis XVI., at the instigation of the minister Calonne, had recourse again to an assembly of N. 1787, Feb. 22—May 25. It consisted of 137 members, among whom were 7 princes of the blood, 9 dukes and peers, 8 marshals, 11 archbishops, 22 nobles, 8 councilors of state, 4 masters of requests, 37 judges, 12 deputies of the Pays d'États, the civil lieutenant, and 25 persons belonging to the magistracy of different cities of the kingdom. Calonne's representations of the state of the finances induced the N. to adopt many reforms in the matter of taxation; but no sooner was the assembly dissolved, than many of them joined the parliaments in opposition to resolutions adverse to their private interests, so that the king was compelled to determine on assembling the states-general. Necker, who had meanwhile been placed at the head of affairs, assembled the N. again 1788, Nov. 6, to consult them concerning the form in which the states-general should be convened. The N. declared against every innovation, and so compelled the court to half-measures which helped to prepare the way for the Revolution.—The parliament of the new principality of Bulgaria is spoken of as the Assembly of the Notables.

NOTAL, a. *nōt'al* [Gr. *notos*, the back]: belonging or pertaining to the back. NOTALGIA, n. *nō-tăl'jĭ-a* [prefix *not-*; Gr. *algos*, pain]: **pain in the back; irritation of the spine.**

NOTARY PUBLIC, or NOTARY, n. *nō'tèr-ĭ* [F. *notaire*, a notary—from L. *notārĭŭs*, a shorthand-writer—from *nota*, a mark, a sign]: officer of the law, whose chief function is to act as a witness of any solemn or formal act, and to give a certificate of the same; which certificate, if duly authenticated, is accepted all the world over as good evidence of the act done in his presence and attested by him. In the United States he is appointed usually by the governor of the state. His chief duty is to attest contracts, writings, and deeds, and to certify to the genuineness of the execution thereof, so that these instruments may be read in evidence in his own and in foreign states and countries, without formally proving their execution. The notary public has the power to administer oaths and protest foreign bills of exchange for non-payment and non-acceptance; and his certificate to that effect is evidence thereof in a foreign country; in some of the states he has the power to protest local bills, and his certificate to that effect is by statute made presumptive evidence thereof. There are statutes in all of the states defining the powers of a notary; and in all the states his powers have been considerably enlarged.

NOTATION, n. *nō-tā'shŭn* [F. *notation*—from L. *notātĭōnem*, a marking or making marks upon—from *noto*, I mark]: act or practice of recording anything by marks or figures: expression of any number or quantity by its appropriate figures; in *music*, the art of representing musical sounds by notes or signs (see NOTE, in Music: MUSIC).

The oldest and most elaborate system of notation is that of mathematics. The use of marks, originally mere tallies, to represent numbers must have preceded all other forms of written language, and is indeed common among tribes to whom other writing is unknown. The next step was the employment of symbols of distinctive shape to designate the individual numbers. The ancient Egyptians had special characters for all the units, all the tens, hundreds, and thousands. The Babylonian numerals, composed of groups of wedge-shaped symbols, ran from 1 to 9, after which additional characters were required only for 10, 100, etc. Thus 400 was indicated by placing the symbol for 4 before that for 100. The Syrians and Hebrews, and later the Greeks and Romans employed the letters of their alphabets to represent numbers. Wherever notation has been carried beyond the most primitive stage, two principles are almost universally observable: the use of 10 as a basis, originating in the habit of counting on the fingers, and the practice, in writing numbers, of placing the larger denomination before the smaller. Here and there are found traces of the use of 5 or 20 as a basis, as in the English 'three score and ten,' the French 'quatre-vingt,' etc., and for special purposes the bases 12 and 60 are sometimes used. The New Zealanders have a scale of 11. But the decimal system has always been practically

universally followed. In composing expressions for numbers, addition and multiplication play a principal *rôle*. Thus 18 in called in Latin 10+8 (*decem et octo*), in Greek 8+10 (*ὀκ ω-καί-δεκα*), in French 10 8 (*dix-huit*), in German 8 10 (*acht-zehn*), etc. But in nearly all systems the higher denomination precedes the lower in the order of the writing, whether this be from left to right, or the opposite as in the case of Hebrew, or from above downward as with the Chinese. An exception occurs in the Roman IV, IX, XL, etc., where the smaller preceding number is *subtracted* from the larger succeeding one.

The Greeks originally denoted the principal numbers by the initial letters of their names, Π for 5 (*πεντε*), Δ for 10 (*δεκα*), etc. About 500 B.C. two new systems appeared. One of these used the 24 letters of the Greek alphabet for the numbers from 1 to 24. In the other system the alphabet, enlarged by three further symbols, was divided into three sets of 9 letters each, of which the first set was used to represent the digits from 1 to 9, the second set the 9 tens, and the last set the 9 hundreds. A subscript I multiplied the value of a symbol by 1,000, a subscript M by 10,000. This system therefore sufficed to express numbers up to nearly 10,000,000. The Roman numerals were probably of Etruscan origin. The symbols I, V, X probably represent the finger, the hand, and the double hand. The C and M, at first of quite different form, took their final shape as the initial letters of *centum* and *mille*. A bar over a symbol multiplied its value by 1,000, and various complications (e. g. $\overline{\text{CCI}}\overline{\text{CC}}$ =10,000, etc.) were introduced in later times. But the Romans usually wrote out large numbers in words. Their whole system was crude and clumsy, and inferior even to that of the Chinese who had a fully developed decimal system with the multiplicative principle for the tens, hundreds, etc., where the Romans used the additive XX, CCC, etc. The oldest Hindu symbols for the digits 1 to 9 were merely abridged names of these numbers. Later the letters of the alphabet were employed; and here we find the first trace of the *zero* in the use of vowels to indicate missing denominations, significant figures being expressed by concurrents. The Sanskrit was prolific in names for large numbers, running up as high as 10^{17} and even further in an apparent religious-philosophical attempt to realize the very infinite.

All the ancient systems of notations were very badly adapted to the purpose of computation. Down to the Renaissance actual calculations were usually performed on the abacus. The great revolution in arithmetic came with the introduction of the positional system by which the *place* of a symbol indicates its value. For this system the zero is indispensable, and this was invented probably by the Hindus about 300-400 A.D., although its first appearance in a written document is dated much later, 738 A.D. By this time the Arabs had became acquainted with the Hindu system and its figures, in-

cluding the zero, and had modified them into the Gubar numerals which, still further altered, appeared as the apices or column marks on the abacus. From these apices our modern Arabic numerals are immediately derived. The Algorism, or Hindu method of arranging arithmetical calculation, found its way into Europe in the 13th century, Leonardo Fibonacci of Pisa having brought it with him on his return from a voyage about the Mediterranean, 1200 A.D. But it was not until about 1500 that, with the invention of printing, it began to get a firm footing in the schools, and its final victory over the abacus came somewhat later, after nearly four centuries of strenuous contest. The last great step toward the perfection of the modern system was the introduction of decimal fractions, about 1600. From that time it became possible to express all numbers, integral or fractional, in a uniform system, and to treat them all by a uniform system of rules of computation. Some trivial variations of notation still occur. Thus the English billion is a million millions, while in France and America billion means a thousand million only. The decimal point is variously written, as in 1.6, 1·6, 1,6; and division may be indicated by ÷, :, /, or the fractional notation. Methods of multiplication and division still vary somewhat in different countries and societies. But these are all minor deviations from a practically universal standard.

Geometry also possesses an extensive notation for points, angles, perpendicularity, parallelism, equivalence, etc. Algebra adopts the arithmetical symbols, but adds to these the representation of general quantities by letters of the alphabet. Known quantities are represented by the earlier letters *a*, *b*, *c*, . . ., unknowns by the later ones . . . *u*, *v*, *w*, *x*, *y*, *z*. In trigonometry small letters *a*, *b*, *c*, . . . usually denote lengths, and capitals *A*, *B*, *C*, . . . are used for angles. In mechanics, astronomy, and analytic geometry Greek letters δ, ϕ, χ, . . . are usually employed to express angles regarded as quantities. Throughout mathematics related sets of quantities are usually expressed by the same letters, the sets being distinguished by accents or subscripts, or by capitalization, etc. Thus *a*, *b*, *c*, . . .: *a′*, *b′*, *c′* . . . .; a_1, b_1, c_1, . . .; *A*, *B*, *C*, . . . Nearly every branch of mathematics has a special symbolism of its own; see under the separate titles.

NOTCH, n. *nŏch* [O. Dut. *nock*, a notch as in the head of an arrow: prov. Sw. *nokke*, an incision: Norm. F. *noque*, a notch (see NICK)]: a hollow cut; a nick: V. to cut in small hollows. NOTCH'ING, imp.: N. the act of cutting into small hollows. NOTCHED, pp. *nŏcht*, cut into small hollows. NOTCH-BOARD, a board which, notched or grooved, receives the ends of the steps of a staircase. NOTCH-WEED, a plant called orach; *Chenopŏdĭum Vulvārĭa*.

NOTE, n. *nōt* [F. *note*—from L. *nota*, a mark or sign by which a person or thing is known—from *notus*, known: It. *nota*]: something by which a thing may be known; notice; heed; a short remark in the margin or at the bottom of a page; a short letter; a memorandum or short writing to assist the memory; a written or engraved paper given as an acknowledgment of a debt, as a bank-note, a pound-note, a note of hand; a diplomatic communication in writing; consequence or distinction, as a person of note; a musical character; a single sound in music; in *OE.*, reproach; stigma; information; intelligence; a short hint: V. to mark; to notice with care; to observe; to set down in writing; to mark or indorse, as an unpaid bill of exchange. NO'TING, imp. NO'TED, pp.: ADJ. remarkable; celebrated. NO'TER, n. *-tĕr*, one who takes notes. NO'TEDLY, ad. *-lĭ*, in *OE.*, with observation; with notice. NO'TEDNESS, n. *-nĕs*, the state of being remarkable; conspicuousness. NOTE'LESS, a. *-lĕs*, not attracting notice. NOTE'LESSNESS, n. *-nĕs*. NOTEWORTHY, a. *nōt wĕr-thĭ*, deserving of notice. NOTE-BOOK, a book for jottings or memoranda. NOTE PAPER, small-sized sheets of paper for writing notes or short letters on. NOTES, brief writings to assist the memory in an extended writing, or a speaker in addressing a public audience; commentaries on a book. TO NOTE A BILL or DRAFT, to record on the back of it its non-payment as a ground of a protest.—SYN. of 'note, n.': sign; symbol; mark; token; minute; annotation; comment; remark; observation; letter; billet; tone; utterance; sound; voice; reputation; consequence.

NOTE, in Music: a character which by the degree that it occupies on the staff represents a sound, and by its form the period of time or duration of that sound. The notes commonly in use in modern music are the semibreve, 𝅝; minim, 𝅗𝅥; crotchet, ♩; quaver, ♪; semiquaver, 𝅘𝅥𝅯; demi-semiquaver, 𝅘𝅥𝅰; and semi-demisemiquaver, 𝅘𝅥𝅱. Taking the semibreve as unity, the minim is $\frac{1}{2}$ its duration, the crochet $\frac{1}{4}$, the quaver $\frac{1}{8}$, the semiquaver $\frac{1}{16}$, the demisemiquaver $\frac{1}{32}$, and the semi-demisemiquaver $\frac{1}{64}$. Notes of greater length than the semibreve were formerly in use—viz., the breve, twice the duration of the semibreve; the long, four times; and the large, eight times the semibreve. Of these the breve, 𝅜 or |𝅝|, is still sometimes met in ecclesiastical music.—The term note is often used as synonymous with musical sound.—See MUSIC.

NOT GUIL'TY: form of verdict, in a criminal prosecution, also in some civil actions, when the jury find in favor of the defendant or accused party. The verdict is conclusive; and the accused cannot, in criminal cases, be tried a second time.

NOTHING, n. *nŭth'ĭng* [*no*, and *thing*]: not anything, no particular thing: no quantity or degree; no importance, value, or use; no fortune or means; no difficulty; a trifle; a symbol or character denoting absence or want; a cipher (see NOTHING, in Mathematics): zero (see NOTHING, in Physics): AD. in no degree; not at all. NOTH'INGNESS, n. *-nĕs*, non-existence; valuelessness. TO MAKE NOTHING OF, to treat as a trifle; to regard as easy; not to understand; not able to invest with a meaning. NOTHING LESS, nothing lower or inferior.

NOTH'ING, in Mathematics (symbol 0): total absence of quantity or number, as when equals are subtracted from equals; often employed (see LIMITS) to indicate the limit to which a constantly decreasing positive quantity approaches. The absence of number or quantity could be equally well signified by the absence of any symbol whatever, but the presence of '0' shows that in its place some number or quantity might, and under other circumstances would, exist.

NOTHING, in Physics (symbol '0'): usually denominated *zero;* having a different meaning from the N. in mathematics. Like the N. in math., it is the starting-point from which magnitude is reckoned; but while the starting-point in the former case is absolute, in this case it is conventional, and by no means denotes absence of all quantity or magnitude. Thus the zero-point of the thermometer must not be interpreted to signify that when the mercury has fallen to this point atmospheric heat has totally vanished, but must be understood as a mere conventional starting-point for graduation, chosen for convenience, and not even necessarily representing any fixed natural degree of temperature.

NOTICE, n. *nō'tĭs* [F. *notice*—from L. *notĭtĭă*, a being known, a knowing—from *notus*, known]: observation by the eye or other sense; a paper that communicates information: a warning; information given (see NOTICE, in Law): attention; civility; respectful treatment: V. to observe by the senses; to regard; to pay attention to; to treat with attention and civility; to remark. NO'TICING, imp. NO'TICED, pp. *-tĭst*. NOTICEABLE, a. *nō'tĭs-ă-bl*, capable of being observed; worthy of observation. NO'TICEABLY, ad. *-ă-blĭ*.—SYN. of 'notice, n.': mention; regard; heed; note; remark; respect; consideration; advice; news; information; intelligence; cognizance; intimation; premonition; civility; —of 'notice, v.': to observe; heed; perceive; mark; see; mind; mention.

NO'TICE, in Law: the possessing of knowledge of existing facts or the act of communicating information. It may be either actual or constructive; it is actual when given to a party directly either orally or in writing, and constructive when a party is presumed by law to have information or when a party has knowledge of facts sufficient to put him upon inquiry; thus possession of real estate is constructive notice to a purchaser of the rights of the party in possession, and when a purchaser has knowl-

edge of any fact sufficient to put him on inquiry as to the existence of some right or title in conflict with that which he is about to purchase, he is presumed to have made the inquiry regarding such right or else is guilty of negligence. A waiver of a N. by a party for whose benefit such notice should be given is equivalent to N., and dispenses with its necessity. In general, N. to an agent is N. to a principal if the agent comes to such N. in the course of his employment; but in order to charge another principal in another transaction with N. gained by the agent in a different transaction, there must be clear proof that the knowledge or N. was present in the mind of the agent at the time of the particular transaction in question. N to a corporation binds it only when made to an officer whose situation and relation to the corporation imply that he has authority to act for the corporation in the matter in regard to which the notice is given. A *notice to produce* is a written N. served on an adverse party in an action directing him to produce certain papers at the trial, or in default secondary evidence of such papers will be given. *Notice of dishonor* or *of protest* is a written N. given to an indorser of a promissory note as to a drawer or indorser of a bill of exchange, that such note or bill has been presented for payment or acceptance, and payment or acceptance has been refused; without such N. the indorser or drawer will not be liable for the payment of the note or bill. *Notice to quit* is a N. by a landlord to a tenant that he elects to terminate the tenancy; unless required by statute, it need be served only when the term of the tenancy is indefinite. *Notice of lis pendens* is a N. filed in the office of the clerk of the court, th an action has been commenced; it must state the parties t the action and the object of the action, and when properly made out, it is constructive N. of the action to all persons acquiring rights from the defendant pending the action. *Notice of trial* is a written N. that the action will be brought on for trial at a certain time and place.

NOTIFY, v *nō′tĭ-fī* [F. *notifier*, to notify—from mid. L. *notificārĕ*, to signify or make known—from L. *notus*, known; *fīō*, I am made]: to make known; to inform; to declare; to give notice. NO′TIFYING, imp. NO′TIFIED, pp. *-fīd*. NOTIFICATION, n. *nō tĭ-fĭ-kā′shŭn* [F.—L.]: the act of making known; notice given; the writing or paper containing a notice.

NOTION, n. *nō′shŭn* [F. *notion*—from L. *notĭōnem*, a making one's self acquainted with, an idea, a notion—from *notus*, known]: thought; knowledge of anything derived from a perception of its relation to other things; idea; sentiment; opinion. NO′TIONAL, a. *-ăl*, existing in idea only; imaginary. NO′TIONALLY, ad. *-lĭ*. NO′TIONIST, n. *-ĭst*, one holding ungrounded opinions.

NOTITE, n. *nō′tīt:* a peculiar mineral occurring in connection with modern volcanoes, found in the Val di *Noto,* in Sicily, whence the name.

NOTKER BALBULUS, *nŏt'kĕr băl'bū-lŭs :* about 840-912; b. n. Switzerland; monk of St. Gall, and magister in its school. He compiled a martyrology; but his chief work was as composer of church-music and of the 'sequences.' N. was canonized 1513.

NO'TO : ancient and handsome town of Sicily, rebuilt on a new site after the earthquake of 1693; 16 m. (24 m. by road) s.w. of Syracuse, 3 m. from the sea. Pop. (1881) 15,925.

NOTOBRANCHIATA, n. plu. *nō'tō-brăngk-ĭ-ā'tă* [Gr. *nōton*, the back; *brangchia*, gills]: a division of the Annelida, so named from carrying their gills upon the back. NOT'OBRANCHIATE, a. *-ĭ-āt*, of or pertaining to.

NOTOCHORD, n. *nō'tō-kawrd* [Gr. *nōton*, the back; *chordē*, a chord]: in *anat.*, the *chorda dorsalis*, an extremely delicate fibrous band in vertebrate embryos, around which the bodies of the vertebræ are afterward developed; the earliest development of the vertebral column. NO'TOCHOR'DAL, a. *-kŏr'dăl*, having a notochord.—See DEVELOPMENT OF THE EMBRYO.

NOTOGLOSSUS, n. *nō'tō-glŏs'ŭs* [Gr. *nōton*, the back; *glōssa*, a tongue]: a muscle of the tongue consisting mainly of longitudinal fibres, lying on the upper surface of the tongue, immediately beneath the mucous membrane.

NOTOPODIUM, n. *nō'tō pō'dĭ-ŭm* [Gr. *nōton*, the back; *podĕs*, feet]: in *zool.*, the dorsal division of one of the foot-tubercles of an Annelide; the dorsal oar.

NOTORHIZAL, a. *nō'tō-rī'zăl* [Gr. *nōton*, the back; *rhiza*, a root]: in *bot.*, having the radicle in the embryonic plant on the back of the cotyledons.

NOTORIOUS, a. *nō-tō'rĭ-ŭs* [mid. L. *notōrĭŭs;* It. *notorio*, notorious—from L. *notārĕ*, to mark; *notus*, known]: publicly known; manifest to the world, usually in an ill sense; conspicuous. NOTO'RIOUSLY, ad. *-lĭ*. NOTO'RIOUSNESS, n. *-nĕs*, the state of being notorious. NOTORIETY, n. *nō'tō-rī'ĭ-tĭ* [F. *notoriété*]: exposure to public knowledge, usually to disadvantage.—SYN. of 'notorious': famous; distinguished; renowned; remarkable; noted; celebrated.

NOTORNIS, n. *nō tŏr'nĭs* [Gr. *nŏtos*, the south; *ornis*, a bird] : genus of birds of family *Rallidæ*, nearly allied to the coots, though in some of its characters it resembles the Ostrich family. One living species only is known, *N. Mantellii*, native of New Zealand. It is particularly interesting, because the genus was originally established and the species characterized by Owen, from remains found with those of *Dinornis* and other large birds of the Ostrich family, called Moas by the New Zealanders. The bird was, however, ascertained 1850 still to exist. It inhabits some of the most unfrequented parts of the Middle Island. It is larger than the other coots, but small in comparison with the true moas. The flesh is said to be delicious. It seems to be a bird likely soon to become extinct unless preserved by human care, and whose domestication would be easy and desirable.

NOTOTHERIUM, n. *nō'tō-thē'rĭ-ŭm* [Gr. *nŏtos*, the south; *thērĭŏn*, a wild animal]: in *geol.*, extinct genus of gigantic Kangaroo-like marsupials, whose remains are found in Australia.

NOTOUR, a. *nō-tôr'* [F. *notoire*, well known—from L. *notōrĭŭs*]: in *Scot.*, notorious; persisted in against all warnings.

NOT PROVEN: form of verdict used in Scotland in criminal prosecutions when the jury think there is some foundation for the charge, but not sufficient evidence to warrant a verdict of guilty. In such a case, a verdict 'Not Proven' is substantially a verdict of acquittal. The prisoner cannot be tried afterward, even though new and conclusive evidence come to light.

NOTRE DAME, *nō'tr-dâm'*, i.e., *Our Lady:* the old French appellation of the Virgin Mary, and therefore the name of a number of churches dedicated to the Virgin Mary in different parts of France, and particularly of the great cathedral of Paris. This splendid Gothic building occupies the site of one of the old Roman temples to Jupiter, and is the largest and most magnificent of the religious buildings for which the city is famed. The first Christian church to take the place of the heathen temple was dedicated to St. Stephen 365. It was reconstructed and enlarged by Childebert about 522, and then received its present name. For about 500 years it furnished a place of worship for the people of Paris. As it was falling into decay, rebuilding became necessary; and 1163 the corner-stone of the present edifice was laid by Pope Alexander III., at the request of the bp., Maurice de Sully. The great altar was consecrated 1182, and the choir was dedicated 1185. The magnificent western front of the cathedral was begun 1208 under direction of Bp. Pierre de Nemours, and other portions were added at still later periods. The chapels in the rear were erected toward the close of the 13th c., and the towers on the w. front were finished at about this date. By direction of Louis XIII., a new altar took the place 1699 of the one originally built, and various changes were made 1771–78 under direction of a celebrated architect. Part of the ornaments of the interior of the building were destroyed by the mob during the French Revolution, and 1793 the leaders of that movement decreed that it should be known and used as the Temple of Reason. A thorough restoration of the cathedral was made 1846–79 under the architects Lassus and Viollet-le-Duc. There are five naves which extend through the building. The central flèche is 312 ft., the western towers are 224 ft. in height, and the vaulting is 105 ft. from the floor. The entire length of the building is 426 ft. and the width 164 ft. For more than 700 years the cathedral has been the centre of church and state ceremonials in France, and on account of the wealth of its historic associations as well as its magnificent proportions, it ranks among the most notable buildings of the world.

NOTRE DAME, *nō'tr dâm*, UNIVERS'ITY OF: Roman Catholic educational institution at Notre Dame, Ind., conducted by members of the 'Congregation of the Holy Cross.' It was founded 1842 by the Rev. Edward Sorin, then and for the remainder of his life superior of the Congregation above named. The university has 11 courses leading to degrees, and 21 collegiate buildings. The institution was chartered 1844 by the legislature of Ind., with all the powers and privileges of a univ., and, under the presidency of Mr. Sorin, became the largest and perhaps the most important Rom. Cath. educational establishment in the United States. The pres. of N. D. Univ. 1902 was Rev. A. Morrissey, C.S.C. In 1901-2 there were 45 professors in the collegiate dept. and 15 in the preparatory; pupils in the preparatory 195, in the collegiate 658; number of volumes in the library 55,000, valued at $75,000; value of scientific apparatus $200,000, and of grounds and buildings $2,000,000. The majority of the professorate are members of the Congregation, but there is a minority of lay professors. N. D. Univ. has no endowment, and is supported by the fees of the students; average annual charge to each resident pupil $300.

NOTT, *nŏt*, ELIPHALET, DD., LL.D: 1773, June 25—1866, Jan. 29; b. Ashford, Conn.; grandson of the Rev. Abraham N., pastor of the Congl. church in Saybrook, Conn. Dr. N. was bro. of Samuel N., D.D. He taught school at the age of 16, and at 18 took charge of Plainfield Acad., pursuing his mathematical and classical studies meanwhile. He attended Brown Univ. a year, but did not graduate, though he received the degree M.A. 1795. He studied theol. with his brother Samuel, and the same year was licensed to preach by the New London Congl. Assoc., which sent him as a missionary into the then sparsely settled section of N. Y. bordering on Otsego Lake, where he established an acad. and acted as pastor of the church at Cherry Valley 1795. He was in charge of the First Presb. Church, Albany, 1798–1804, and in the latter year was elected pres. of Union Coll. The institution was young, almost destitute of funds, in debt, and without suitable buildings or apparatus. He succeeded in having a law passed by the legislature 1814, enabling him, by means of a lottery, then a legal and usual means of obtaining money, to provide for its most urgent needs. He was a practical educator, and by his remarkable executive ability and power as a disciplinarian, soon attracted students from all parts of the country. During his incumbency of 62 years, there were more than 4,000 graduates. The semi centennial of the coll. was held in the presence of 600 of his former pupils. He governed by the parental system, rejecting rigid conventional methods. He was an earnest advocate of temperance, an opponent of slavery, and a strong supporter of civil and religious freedom, speaking and writing extensively on these subjects. His published writings consist mainly of sermons and addresses, that on the death of Alexander Hamilton

having a national reputation. He also published *Counsels to Young Men* and *Lectures on Temperance.* He was not only a skilful financier and an able theologian, but also, beyond question, one of the most finished pulpit orators of his time. His many-sided genius and ability were apparent in other directions. His mechanical skill was great; his patents on inventions pertaining to the application of the laws of heat numbered 30, the most notable being the first stove for burning anthracite coal. One of his inventions, known as a 'novelty,' so called because of its economical peculiarities, gave rise to the famous iron manufactories, the Novelty Works. His force of character was indomitable, and in all things he was controlled by high Christian principles. He received the degree D.D. from Princeton Coll. 1805, and LL.D. from Brown Univ. 1828. He died in Schenectady, N. Y.

NOTT, SAMUEL: missionary: 1788, Sep. 11—1869, June 1; b. Franklin, Conn.; son of Samuel N., D.D., and nephew of Eliphalet N., D.D., LL.D. He graduated at Union College 1808, and at Andover Theol. Seminary 1810. He was sent as missionary to India by the American Board 1812, but returned 1816 because of failing health. He afterward taught school in New York. He held pastorates subsequently in Galway, N. Y., and Wareham, Mass. He established a private acad. at the latter place 1849, which he conducted with success for 17 years. He died in Hartford, Conn.

NOTTINGHAM, *nŏt'ĭng-am:* municipal and parliamentary borough of England, cap of the county of the same name, and a county in itself, on the Leen at its junction with the Trent, 128 m. n.n.w. of London. It is built principally on the slope and at the foot of a rocky eminence, and architecturally it has within recent years been much improved. The market-place is 5½ acres in extent, surrounded by lofty buildings. The Trent, which passes about a mile s. of the town, and is here about 200 ft. wide, is crossed by railway bridges, and by an ancient bridge of 19 arches. The exchange, the town and county halls, the House of Correction, St. Mary's Church, the Rom. Cath. Cathedral (by Pugin), the new Free Grammar-school erected 1868, new Post-office (1868), and the Albert Hall (1876), are noticeable buildings. The Free Grammar school (endowment about £1,000 a year) was founded 1513. University College, mainly a science school, was opened in a noble range of buildings 1881. There is a Congl. Institute for missionary and evangelistic education. An art-school, natural-history museum, and public library are among the flourishing institutions of N.; and there are hospitals for the poor and infirm. Of the manufactures, which are various and important, the principal are bobbin-net and lace, and cotton, silk, and merino hosiery; and there are cotton, silk, and flax mills, bleaching-works, also iron and brass works. New municipal buildings were erected 1883. N. has been a manufacturing town for 600 years: it is believed to have been a Celtic settlement, and rose to importance in the 9th c.

The ancient castle of N., ruined during the civil wars, was rebuilt after the Restoration, and burnt during the Reform Bill riots. In 1878 it was restored, and transformed into a museum and picture-gallery.—Pop. (1871) 86.621; (1881) mun. bor. 186.575; (1901) 239,753.

NOT'TINGHAM, or NOTTS: inland county of England, bounded n. by Yorkshire and Lincolnshire, e. by Lincolnshire, s. by Leicestershire, w. by Derbyshire; length n. to s. about 50 m., greatest breadth about 25 m.; 825 sq. m., or 526,176 acres. The meridian of 1° w. falls along the middle of the county, and may be said to divide it into two nearly equal portions, of which the e., comprising the vale of the Trent, is level, and the w. is occupied by hills of no great height. In the s. of the county are the wolds, consisting of upland moors and pasture-lands, broken up by many fertile hollows. The country generally is finely wooded, and in the w. are the remains of the royal forest of Sherwood, famous as the chief haunt of Robin Hood. The principal rivers are the Trent, and its tributaries the Erewash, Mann, and Idle. The Nottingham and Grantham canal in the s. connects the Trent with the Witham, and these two rivers are also connected by the Fosse Dyke canal, which, running n.w. from the city of Lincoln, joins the Trent on the n.e. boundary of the county. By the rivers, canals, and the N. Midland, Sheffield and Lincoln, and Great Northern railways, there is direct communication in every direction. The climate, especially in the e., is remarkably dry. The soil is various; and, in productiveness, the land is not above mediocrity. The usual crops are raised; there are many hop-plantations, and much land is laid out in market-gardens. Extensive tracts have been planted recently. Pop. (1871) 319.758; (1891) 231,745; (1901) 274.684.

NOTTWHEAT, n. *nŏt'hwēt* [OE., *nott*, shorn]: wheat not bearded.

NOTWITHSTANDING, conj. prep. *nŏt'with-stănd'ĭng* [formed of *not*, *with*, and *standing*]: without hindrance from; not hindering; in spite of; despite; although; nevertheless; however.

NOUCH, n. *nowch:* the same as OUCH, which see.

NOUGHT, n. *nawt* [AS. *naht* or *nauht;* Ger. *nicht*, nought]: not anything; nothing: AD. in no degree. TO COME TO NOUGHT, to be brought to nothing. TO SET AT NOUGHT, to slight; to despise; to disregard; the same as NAUGHT, which see.

NOU'KHA: see NUKHA.

NOUL, or NOULE, or NOWL, n. *nowl* [AS. *hnol* or *cnoll*, knoll, top]: in *OE.*, the crown or top of the head; the head.

NOULD, n. *nûld* [AS. *ne wolde*, not would]: in *OE.*, would not.

NOUMEA, *nô-mā-â'* (called also *Port de France. por dĕh frŏngss*): chief settlement in the French penal colony of New Caledonia (q.v.). Pop., besides convicts and soldiers, (1901) 4,010.

NOUMENON, *nū-mĕn'-ŏn* [Gr. *nooumenon*, something known, from *noein*, to know]. In Plato the term is applied to the intelligible. In Kant, to whom the modern use of the term is mainly indebted, it applies to the world of possible reality beyond our actual knowledge.

NOUN, n. *noun* [OF. *non*, a noun—from L. *nomen;* F. *nom*, a name]: in *gram.*, a part of speech embracing the name of a person, place, animal, thing, or quality; a name; a substantive.—*Noun*, in Grammar, is a word that 'names' or designates the person or thing spoken about. In a wide sense, such words as *rich*, *tall*, are nouns, as well as *John*, *man*, *tree;* for they are names applicable to all objects possessing these attributes. But as words like John, man, tree, suffice of themselves to mark out or designate an object or a definite class of objects, while words expressive of a single attribute, like *rich*, *tall*, can be used only in conjunction with (or with the added signification of) such a word as *man* or *tree*, the one class are called Adjective Nouns, or simply Adjectives (q.v.), while the other are called Substantive Nouns, or simply Substantives or Nouns. Nouns or Names, in this narrower sense, may be divided into classes in a variety of ways, according to the ground taken for the division.—One of the distinctions commonly made by grammarians is into *Proper Nouns* and *Common Nouns*. A proper Noun is usually defined as 'the name of any individual person, or place,' as *John*, *London;* while a common noun is applicable to every individual of a class of objects, as *prince*, *city*. But this definition fails to point out the real difference; for there are several Londons, and there are more Johns than princes; other things also have proper names, besides persons and places, as ships (the Constitution), and bells (Big Ben). On the other hand, though 'Providence' is used as applicable to only One Being in the universe, it is not a proper noun. Wherein, then, lies the difference? To answer this question, we must advert to an important distinction made by logicians with regard to the import of names. A word is said to *denote* all the objects to which it is applicable as a name; thus, the word *man* is a name for all the objects known individually as James, John, Adam, Pope Hildebrand, Cromwell, etc., and therefore denotes the whole human race; but while thus denoting or naming them, it also implies something concerning them: in the language of logic, it *connotes* that they possess certain attributes, namely (1) a certain corporeal form, known as the human form; (2) animal life; (3) rationality. All this, at least, is included in the *meaning* or connotation of the word 'man.' Now, if we consider any noun of the class called common, we find that while it denotes, or names, or points out a certain object, or class of objects, it also conveys or implies some qualities or facts concerning them; in other words, all such names are *connotative*, or have a meaning,

Not so with proper nouns. To say that a man is called John Butler, informs us of no quality that he possesses, or of any fact except that such is his name. The name itself conveys no meaning; it is *non-connotative*. And this is what really constitutes a proper name; it is affixed to an object, not to convey any fact concerning it, but merely to discriminate it as an individual or set it apart from other objects of thought and speech. Proper names, indeed, are often given at first on account of the object possessing certain attributes; but once given, they do not continue to connote those attributes. The first John Baker was probably so called because he exercised the trade of baking; but his ceasing to bake would not have made him lose the name; and his descendants were called Baker, regardless of their occupation. In this view the A, B, C, etc., which a geometrician affixes to the several angles of a figure, are as much proper names as Tom, Lawrie, etc., applied to the individual bells of a chime. The proper contrast, then, to a Proper N. is not a Common N.—meaning by that a name common to a class of objects—but a Significant Noun.

Of Significant Nouns, by far the greater number are General or Class Names; that is, they can be applied to any individual of a class of objects, implying that all these individuals have certain attributes in common—as *quadruped, book*. The quadruped spoken of may perhaps be a *horse*, and here we have another class-name, applicable to the same object, but of less generality than 'quadruped.' *Animal*, again, is more general than quadruped, being applicable to a far wider class. But it is important to observe, that as the number of objects that the terms are applied to, or denote, increases, the number of attributes that they imply—in other words, the amount of their meaning—diminishes. To call an object an 'animal,' merely implies that it is organized and is alive (with that kind of life called animal life); to call it a 'quadruped,' implies all this and a number of attributes in addition; and to call it a 'horse,' implies a still further addition.

It is to this class of words that the term Common Nouns is properly applicable; and the contrast to them is not Proper Nouns, but what might be called Singular Nouns, such as 'God,' 'providence,' 'universe.'

Collective Names are such as *regiment, fleet, senate, shoal*. They form a subdivision of Class Names or Common Nouns; for *regiment* is applicable to all collections of men organized in a particular way.

Names of Materials are such as *iron, water, sugar, wheat*. These two classes appear in many cases to merge into each other. In both, the objects named consist of an aggregation; but in collective names, the parts forming the collection are thought of as individual objects; as the *soldiers* of a regiment, the *fishes* composing a shoal. Substances, again, like iron, gold, water, are not made up of *definite* individual parts (at least to our senses); and in such as wheat, sand, the name of the individual visible part (*grain of wheat, grain of sand*) is derived from the name of the

mass, showing that the idea of the individual is swallowed up in that of the mass.

A convenient term for names of materials or substances is that used by German grammarians—Stuff-nouns. Sometimes the same word is used as a stuff-noun and as a class-noun. Thus: 'The cow eats *grass*' (stuff-noun); 'The botanist studies the *grasses*, and has found a new *grass*' (class-noun); 'They had *fish* (stuff-noun) for dinner, and consumed four large *fishes*' (class-noun).

Names of materials are not, like collective nouns, a subdivision of common nouns; they belong to the contrasted class of singular nouns; and, when the substance is simple or invariable in composition, cannot be used in the plural; as *gold*, *water*, *beef*.

Abstract Nouns.—In the expression 'hard steel,' or 'the steel is hard,' the word *hard* implies a certain quality or attribute as belonging to the steel. This quality has no existence apart from steel or some other substance; but I can withdraw (*abstract*) my thoughts from the steel in other respects, and think of this quality as if it had an independent existence. The name of this imaginary existence or abstraction is *hardness*. All words expressive of the qualities, actions, or states of objects, have abstract nouns corresponding to them; as *brave—bravery; strike—stroke; well—health*. In opposition to abstract nouns, all others are *concrete* nouns—that is, the attributes implied in them are considered as embodied in (*concrete*, Lat. growing together) the actual existences named.

NOUREDDIN-MAHMÛD, *nôr-ĕd-dēn′ mâch-môd′*, MALEK-AL-ADEL, *mâl′ĕk-al-â′dĕl:* one of the most notable men of his time, and the scourge of the Christians who had settled in Syria and Palestine: 1116, Feb. 21—1174, May 15; b. Damascus. His father, Omad-ed-din Zengui, originally gov. of Mosul and Diarbekir on behalf of the Seljuk sultans, had established his independence, and extended his authority over n. Syria, including Hems, Edessa, Hamah, and Aleppo. N. succeeded him 1145, and the better to carry out his ambitious designs, changed the seat of govt. from Mosul to Aleppo. Count Joscelin of Edessa, thinking the accession of a young and inexperienced sovereign afforded him a favorable opportunity of regaining his territories, made an inroad at the head of a large force, but was signally discomfited under the walls of Edessa, his army, with the exception of 10,000 men, being annihilated. The report of N.'s success being conveyed to w. Europe, gave rise to the second Crusade. The Crusaders were, however, foiled by N. before Damascus, and, being defeated in a number of partial conflicts, abandoned their enterprise in despair. N. next conquered Tripolis and Antioch, the prince of the latter territory being defeated and slain in a bloody conflict near Rugia (1149, June 29), and before 1151 all the Christian strongholds in Syria were in his possession. He next cast his eyes on Egypt, which was almost in anarchy under the feeble sway of the now effeminate Fatimites, and, as a preliminary step, 1156, he took possession of Damascus, which till this time had been

ruled by an independent Seljuk prince; but a terrible earthquake which at this time devastated Syria, levelling large portions of Antioch, Tripolis, Hamah, Hems, and other towns, put a stop to his scheme for the present, and compelled him to turn all his energies to recovery from this destructive visitation. An illness which prostrated him, 1159, enabled the Christians to recover some of their lost territories, and N., in attempting their resubjugation, was totally defeated near the Lake of Gennesareth by Baldwin III., King of Jerusalem; but undismayed by this reverse, he resumed the offensive, defeated the Christian princes of Tripolis and Antioch, making prisoners of both, and again invaded Palestine. Meanwhile, he had obtained the sanction of the caliph of Bagdad to his projects concerning Egypt, and, the Moslem believers flocking to his standard from all quarters, a large army was soon raised, which, under his lieut. Shirkoh, speedily overran Egypt. Shirkoh, dying soon after, was succeeded by his nephew, the celebrated Salah-ed-din (q.v.), who completed the conquest of the country. N., becoming jealous of his able young lieut., was preparing to march into Egypt in person, when he died at Damascus. N. is one of the heroes of Moslem history. Brought up among warriors who were sworn to shed their blood for the cause of the Prophet, he was not, like the majority of his co-religionists, a mere warrior or conqueror, but zealously promoted the sciences, arts, and literature, and established a strict administration of justice throughout his dominions. In his high station he retained the simplicity of the first caliphs. He was revered by his subjects, both Moslem and Christian, for his moderation and clemency; and even his bitter enemies among the Christian princes extolled his chivalrous heroism and good faith. He had the faculty of impressing his own fiery zeal for the supremacy of Islam upon his subjects, and their descendants at the present day have faithfully preserved both his name and principles.

NOURICE, n. *nŭr'ĭs* [F. *nourrice*, a wet-nurse]: in *OE.*, a nurse.

NOURISH, v. *nŭr'ĭsh* [F. *nourrice*, a wet-nurse; *nourrissant*, nourishing—from *nourrir*, to nourish: L. *nutrĭō*, I nurse or suckle]: to supply with food; to support; to encourage; to cherish; to train or educate: N. in *OE.*, a nurse. NOUR'ISHING, imp.: ADJ. promoting growth; nutritious. NOURISHED, pp. *nŭr'ĭsht*. NOUR'ISHER, n. *-ėr*, one who or that which nourishes. NOUR'ISHABLE, a *-ă-bl*, capable of receiving nourishment. NOUR'ISHMENT, n *-mĕnt*, that which nourishes; food; sustenance. NOUR'ISHINGLY, ad. *-lĭ*.—SYN. of 'nourish, v.': to feed; provide; nurture; supply; comfort; educate; intrust;—of 'nourishment': food; support; sustenance; nutriment; nutrition; sustentation.

NOURSLE, v. *nėr'sl*, or NOUSLE, v. *nŭz'l* [see NURSE]: in *OE.*, to nurse up; to feed with delicacies. NOURS'LING, or NOUS'LING, imp. NOURSLED, pp. *nėr'sld*, or NOUSLED, pp. *nŭz'ld*.

NOUS, *nŭs* [Gr. *nous*, reason]: term employed variously by philosophical writers from the time of Anaxagoras to the present. It is sometimes employed to designate the intelligent guiding spirit which rules the universe, sometimes to characterize the highest insight of personal wisdom. Each system which makes use of the term assigns to it a peculiar significance, which can only be understood in the light of the system as a whole.

NOUVEAU RICHE, phrase, *nô-vō′rēsh*, plu. NOUVEAUX RICHES [Fr. new rich]: one whose wealth is of recent acquirement; especially one whose conduct in reference to his large possessions shows him unused to them.

NOUVEL, *nô-vĕl′*, GABRIEL EDOUARD: 1836-94, Nov.; b. Bapaume, France. He left college and went to Canada 1655, was placed in command of the Huron Indians near Sault Ste. Marie, became adjt.-gen. at Montreal 1672, obtained govt. land grants, and attempted to found a colony at the mouth of the Niagara river 1675. He was killed in an attack on Fort Nelson.

NOVA, *no′vâ*, JUAN DE: navigator: b. in Spain; d. about 1520. He became a skilful pilot, entered the service of the king of Portugal 1501, was placed in command of an expedition with which Amerigo Vespucci was connected, discovered various points in S. America, and won the friendship of the natives. He died in the E. Indies.

NOVACULITE, n. *nō-văk′ū-līt* [L. *novacŭlă*, a razor]: a mineralogical term for whet-slate or razor-stone, in allusion to the principal purpose for which it is employed. It is a siliceous slate, the homogeneous compact portion of the argillaceous schists of the paleozoic period.

NOVA′LIS. See HARDENBERG, FRIEDRICH VON.

NOVARA, *nō-vâ′râ:* province in Piedmont, Italy: s. of Switzerland, w. of Lombardy, e. of Turin, and n. of the river Po; area about 2,525 sq. m. It is traversed by the Alps, but contains many very fertile valleys, in which hemp and various kinds of grain are grown. Silk is a product of some importance. The principal river is the Toce, fed by numerous Alpine streams. Cap., the city of Novara. Pop. (1901) 743,115.

NOVARA, *nō-râ′râ:* historic town, province of Novara, Italy, about 30 m. from Milan. Until recently it was surrounded by high walls with 4 gates for entrance. It has a magnificent cathedral dating originally from the year 400 (mostly rebuilt 1860-70), numerous fine public and private buildings, large municipal library, and several educational and charitable institutions. There are manufactures of cotton, linen, earthenware, candles, and starch, and extensive trade in grain. Several important battles have been fought in this vicinity. Pop. (1901) 45,248.

NOVARGENT, *nō-vâr′jĕnt* [L. *novus*, new; *argentum*, silver]: preparation of chalk moistened with a solution of oxide of silver in a solution of cyanide of potassium.

NOVA SCOTIA, *nō′va-skō′shĭ-a:* one of the three Atlantic provinces of the Dominion of Canada, bounded n. w. by New Brunswick and the Bay of Fundy, n. by the Straits of Northumberland and the Gulf of St. Lawrence, and on the other sides by the Atlantic Ocean. It consists of two portions: N. S. proper, a large peninsula connected with New Brunswick by an isthmus about 12 m. wide; and the island of Cape Breton (q. v.); total area, 21,731 sq. m. The peninsula, about 260 m. long and 50 to 100 broad, extends e. n. e. and w. s. w. Cape Breton lies n. e. of N. S. proper, separated by a narrow strait, the Gut of Canso, 16 m. long, and half a mile to 2 m. wide. The island is 110 m. in extreme length and 85 m. in width, and is divided into nearly equal parts by the Bras d'Or Lake. Sable Island, 25 m. long, 1¼ m. wide, is surrounded by a dangerous, widely-extended sand-bank: the island is about 90 m. from the nearest coast of N. S., lat. 44° n., long. 60° w. It is formed of sand-hills thrown up by the sea, some of them about 80 ft. in height; and portions are being rapidly washed away by the sea. The island is covered with wild grasses, which support herds of wild horses, known as Sable Island ponies. It is in the track of vessels trading between America and Britain, and because of the number of wrecks that take place on its shores, a supt. and several men, two light houses and a Marconi telegraph equipment are stationed here with supplies for shipwrecked mariners. The principal towns in N. S. are Halifax, the capital, Sydney, Glace Bay, Yarmouth, Truro, Springhill, Amherst, New Glasgow, Windsor, and Pictou.

Topography, Soil, Climate, Etc.—The N. S. coast-line is about 1,000 m. long, and the shores, much indented, abound in excellent bays and harbors, of which the chief are Chedaucto Bay, Halifax Harbor, St. Margaret's, Mahone, and St. Mary's bays, Annapolis, Minas, and Chignecto basins, and Pictou Harbor. The more important of these inlets or harbors are on the Atlantic coast; the north shore, on the Gulf of St. Lawrence, is comparatively smooth and uniform in its coast line, as is also the eastern coast of Cape Breton, but the other shores of the island are very irregular. There are numerous rivers, but few are more than 50 m. in length; the most important are the Avon, the Annapolis, the La Have, and the Shubenacadie. N. S. contains about 400 lakes, of which the Bras d'Or, in Cape Breton, covers an area of 500 sq. m., or about one-sixth of the entire area of the island; it is, however, a deep land-locked inlet of the sea; its scenery is unique and impressive. Lake Ressignol in Queen's County is the largest lake in the peninsula. The surface is irregular and undulating, but not elevated. Three ranges of hills, sub-parallel to the Appalachian Range, traverse N. S. in the direction of its length from s. w. to n. e. The Cobequid Mountains, 60 m. from the Atlantic, 1,100 ft. high, traverse the peninsula from the Bay of Fundy to the Straits of Canso through the counties

of Cumberland, Colchester and Pictou. Another range, the South Mountains, which is flanked on the Atlantic side by the Lower Cambrian formation, except for belts of intrusive granite, extends through the middle of the counties Yarmouth, Digby, Annapolis and King's, sinking in Hants before merging into Cobequid range. The third range, the North Mountains, about 700 ft. high, extends along the Bay of Fundy parallel to the South Mountains, from Digby County to the steep headland of Blomidon in King's County, near the entrance of Cobequid Bay.

The rock formations of the valleys between these two ranges of hills are of Upper Silurian, Devonian, Carboniferous and Triassic origin. The soil in these valleys of the Annapolis and Cornwallis is rich and fertile, producing all the fruits of temperate climates; and, especially in the n., the uplands also are fertile. The scenery is like a garden for richness of cultivation, and presents varied and charming views. The climate is remarkably healthful, its rigor being modified by the insular situation of the province, and by the influence of the Gulf Stream. The mean temperature for the year is 42.09° at Pictou, and 43.6° at Windsor. The extreme limits of the thermometer may be stated at −15° Fahr. in winter, and 95° in the shade in summer. The average temperature in summer is 65° F., and 25° in winter. The average rainfall is 38.1 and the snowfall 75.4. The flora and fauna of N. S. compares with the other sections of Canada south of the St. Lawrence. The principal trees are elm, oak, pine, spruce, tamarack, hemlock, birch and maple. Moose, bears, foxes, wild cats, and other smaller animals are found in considerable numbers.

Minerals.—The province abounds in mineral riches, including gold, lead, copper, manganese, gypsum, barytes, coal, and iron. Gold was discovered in the colony 1861, March, on Tangier river about 40 m. e. of Halifax. There are more than 20 districts in which gold is mined. The chief diggings are along the Atlantic coast. The gold-bearing region extends over 3,000 sq. m. The gold mines have been worked steadily, and in many cases profitably. The average annual yield is 10,000 to 14,000 ounces; total yield for the year ending 1904, Sept. 30, 14,279 ounces. Coal and iron are abundantly distributed and the former extensively worked. About 5,000,000 tons of coal are raised annually. In 1904 the production amounted to 5 247,135 tons. There are 18 coal mines in the province, 10 of which are in the peninsula and 8 in Cape Breton. They employ over 11,000 persons. The production of the minerals in 1904 was as follows: iron-ore 258,338 tons; gypsum 181,166 tons; barytes 1,100 tons, and grindstones 800 tons. There were also 235,158 tons of coke made.

Fisheries.—The fisheries of N. S. are active and form the source of a large income to the inhabitants. The catch consists chiefly of cod, mackerel, shad, salmon, lobsters and other fish which abound in the rivers and along the shores. The lobster-canning industry has assumed con-

Longitude West from Greenwich.
QUEBEC
GULF OF ST. LAWRENCE
ATLANTIC O.
NEW BRUNSWICK
PRINCE EDWARD ISLAND
NOVA SCOTIA
BAY OF FUNDY
NORTHUMBERLAND STRAIT
CHALEURS BAY
MAGDALEN ISLANDS (Quebec)
Causapscal
Maria
Raspebiac
Dalhousie
Metapedia
Dalhousie Jc.
Jacquet River
Grande Anse
Alexanders Point
Shippegan I.
Shippegan
Pokemoukee Jc.
Gloucester Jc.
Bathurst
Tracadie Mills
Upsalquitch R.
Restigouche R.
Edmundston
St. Anns
Bartibogue Sta.
Miramichi Bay
Van Buren
Grand Falls
Newcastle
Loggieville Sta
Derby Jc.
Chatham
Chatham Jc.
Caribou
Aroostook Jc.
Indiantown
St. Louis
Richibucto
Presque Isle
Plaster Rock
Blackville
West Pt.
Ashland
Perth
Bath
Miramichi
Kent Jc.
Buctouche
Boisetown
Richmond
Cape Egmont
Cape Traverse
Pedeguac
Kellys Cross
Charlottetown
Cardigan
Georgetown
Montague Bridge
Murray Harbor
Port Hood
Port Hood I.
Orangedale
Baddeck
Middle River
Margaree Harbor
Grand Etang
Eastern Harbor
Wreck Cove
North Shore
Bird I.
Cape North
Pleasant Bay
Ingonish
Aspy B.
Bay St. Lawrence
St. Pauls I.
S. Cape
Amherst I.
N. Cape
E. Cape
Grosse I.
Coffin I.
Alright I.
Grindstone
Byron I.
Bird Rocks
Woodstock
Houlton
Debec Jc.
Canterbury Sta.
Mattawamkeag
Newburg Jc.
Zionville
Chipman
Salisbury
Moncton
Burnside
Gibson
Grand Lake
Petitcodiac
Havelock
Albert Mines
Elgin
Harvey
Rockville
Alma
Fredericton
Codys
Fredericton Jc.
McAdam Jc.
Watt Jc.
Hampton
Norton
Quaco
St. Martins
Chignecto Bay
Spring Hill Mines
Apple River
Parrsboro
Parrsboro Shore
Advocate Harbor
Minas Basin
Minas Channel
Maitland
Truro
Brookfield
Eastville
Lower Stewiacke
Upper Stewiacke
Musquodoboit
Shubenacadie
Liscomb
Port Mulgrave
Boylston
Oyster Pond
Guysborough
Port Hilford
Canso
Pt. Gall
Cape Mocodome
Isaacs Harbor
Chedabucto Bay
Port Felix
Port Dufferin
Port Deckerton
Port Bickerton
Tracadie
Port Tupper
Port Hawkesbury
Bras D'or
Marble Mountain
Red Island
Loch Lomond
Soldiers Cove
Lower Framboise
Gabarouse
Louisburg
Sydney
Sydney Mines
Glace Bay
Little Glace Bay
Bridgeport
Hogan
Boisdale
Englishtown
Grand Narrows
L. Ainslie
Mc Kinnons Harbor
Cocomagh
Orangedale
Port Hood
Port Hood I.
Margaree Harbor
Cheticamp
Cheticamp I.
Pt. Michaud
Pt. du Chene
Shediac
Amherst
Maccan
Springhill
Oxford
Pugwash
Wallace
Tatamagouche
Pictou
New Glasgow
Stellarton
Westville
Thomson Station
Greenville
Village
Belmont
Fisher Is.
Glengarry
Glenelg
Thorburn
Pictou I.
Merigomish
Antigonish
Pomquet
Tracadie
Harbour au Bouche
Lorne
Riversdale
Sunnybrae
Parrsboro
Kingsport
Kentville
Wolfville
Windsor
Windsor Jc.
Berwick
Wilmot
Middleton
Annapolis
Bridgetown
Torbrooke
Cleveland
New Ross
Elmsdale
L. Major
Dartmouth
Ship Harbor
Lake Charlotte
Spry Bay
Salmon River
Goose I.
Liscomb I.
Musquodoboit Harbor
Lawrencetown
Halifax Harbor
Prospect
Chester
Mahone
Springfield
Brookfield
Northfield
Bridgewater
Caledonia Corner
Lake Rossignal
Meteghan
Meteghan Sta.
Freeport
Digby
Bear River
Weymouth
Grand Manan I.
Whitneyville
Machias
Ellsworth
Mt. Desert Ferry
Bar Harbor
Mt. Desert I.
Hebron
Belleville
Yarmouth
Argyle
Shelburne
Arcadia
Pubnico Harbor
Barrington
Cape Sable
Long L.
Port Medway
Milton
Liverpool
Head of Jordan R.
Lockport
Calf Pt.
Lunenburg
Sable Island
NEW BRUNSWICK, NOVA SCOTIA & PRINCE-EDWARD ISLAND
SCALE OF STATUTE MILES.
0 5 10 20 30 40 50 60 70 80 90 100
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R., M°N. & CO., ENGR'S, CHI.
A B C D E
1 2 3
45
65°
60°

siderable proportions, employing over 6,000 persons, and the number of men employed in the fisheries is over 25,000. The Dominion government has given the industry a stimulus by granting a subsidy, outside of bounties, which averages about $400,000 a year. In 1904 the total value of the fish caught was $7,287,099.

Agriculture.—Of the entire area of N. S. above tide-level, 13,483,671 acres, 5,000,000 acres are occupied. Of this, 34,240 acres are covered by orchards of apples, pears, plums, and cherries; 554,371 acres are hay land, 16,334 are in wheat, 37,459 in potatoes, and 91,087 in oats. Three-fourths of the whole area are comprised in the peninsula of N. S., and the remainder in the island of Cape Breton. The principal agricultural products are hay, wheat, and turnips. In 1901 the yield was, apples 2,065,104 bushels; plums, 28,931 bushels; peaches, 3,231 bushels. The yield of hay in 1906 was 690,000 tons; wheat 200,000 bu.; barley 150,000 bu.; oats 2,100,000 bu.; potatoes 3,200,000 bu., and rye 14,000 bu. The total value for 1902-3 of agricultural products, including fruit, was $853,106, of apples alone $188,910, of animals and dairy products $711,207, of woods exported $1,048,160.

Manufactures.—Manufactures include coarse cloths and flannels, leather, boots, saddlery, machinery, tobacco, agricultural implements, drugs and chemicals, furniture, iron and steel, wood pulp, fertilizers, coke, biscuits and breads, extract of hemlock bark, and paper; and ship-building, the canning of fruits, milk and meat, tanning, rope and twine making, and sugar refining are carried on. According to the census of 1901 there was $34,586,416 invested in the manufacturing industries; the salaries and wages paid amounted to $5,613,571; miscellaneous expenses aggregated $1,040,833; the cost of material used was $13,161,077; and the value of the products was $23,592,513.

Commerce, Transportation, Finance.—The exports from the two ports of Halifax and Sydney for the year 1904 amounted to a gross value of $11,300,398; the products of mines being $1,754,547, of the fisheries $3,715,612, of the forest $1,144,252, of animals and their products $903,334, of agricultural products $2,204,188, of manufactures $1,573,347, the balance miscellaneous. In 1904 the value of manufactured products exported from Halifax was $814,420. The total exports for the year ending 1904, June 30, were valued at $17,096,839; the imports at $13,167,649. The total number of ships arriving from foreign ports during the fiscal year ending 1904, June 30, was 6,680 of 2,386,608 tons; the clearances were 6,956 ships of 2,503,590 tons. Halifax is the third commercial port in Canada. There are now about 1,300 m. of railway in the province; there are two cable stations, one at Canso and one at Sydney, and the province is a network of telegraph and telephone lines. The revenues for the province during the fiscal year ending 1904, Sept. 30, were $1,194,755, the principal items of which were the Domin-

ion subsidy of $432,805, and the mine royalties of $585,252. The expenditures aggregated $1,161,456, including $270,835 for education, $164,776 for public charities and $159,154 for debenture interest. There was also a capital expenditure of $1,191,129, of which $1,001,666 was for railways. The public debt was $7,364,623, and the assets $2,917,952. The local banks with their branches include the Bank of N. S., the Union Bank of Halifax, the Royal Bank of Canada. Their assets in 1905 aggregated $81,147,547 and deposits $56,594,095. The clearing house transactions in 1905 amounted to $89,251,563, and in 1906 to $91,837,507.

Religious, Charitable and Educational Institutions.—The chief religious denominations are the Roman Catholic Church with 129,579 communicants, Presbyterian 106,319, Baptist 74,978, Anglican 66,067, Methodist 57,400, Free Will Baptist 8,355, Lutheran 6,572, Congregational 2,938. The province supports a school for the deaf and dumb and one for the blind, an insane and a general hospital, and 24 poor-houses. Criminals are sent to the provincial penitentiary at Dorchester, N. B. The free school system in N. S. dates from 1865 but there are no separate schools which are under denominational control and receive government support. Education is under control of the Council of Public Instructions. The Council consists of the members of the Executive Council and the Superintendent is the Secretary. The schools are supported partly by local taxation and partly by subsidy, about two-fifths of the cost being contributed by government grant and municipal aid. Each of the 18 counties maintains an academy and the larger towns, high schools; there are also a normal school at Truro and private schools for boys and girls at Halifax, Windsor, Wolfville and Horton. The schools for special training in the province include a college of agriculture, schools of mechanical science and domestic science, several manual training schools, a school of art and design, and a summer school of science. The colleges are Kings at Windsor, Dalhousie (non-sect.) at Halifax, Acadia at Wolfville, Saint Francis Xavier at Antigonish, and St. Anne's at College Point in Digby County. The theological college on the North West Arm, Halifax, is Presbyterian. In 1906 there were 2,446 schools in operation in the province; the total number of teachers was 2,578; total pupils in public schools 100,332; the average attendance was 59,165; the value of school property is over $2,000,000; and of property taxed for schools, about $100,000,000.

Government.—Since confederation N. S. has been represented in the Canadian parliament by 10 senators and 20 members of the lower house. It has also its own local legislature and lieut.-gov.; the legislature consisting of a council of 21 members and a house of assembly of 38 members, elected by the counties, which are 18 in number. The executive consists of 3 salaried ministers and 6 without portfolios. In each county or municipality the people elect a council which appoints the other officials.

History.—N. S. is supposed to have been visited and 'discovered' by the Cabots, 1497. Its first colonists were Frenchmen, who, under Sieru de Monts, a gentleman of the bedchamber of Henry IV. of France, established themselves at Port Royal 1604. The French trading company failed in 1607 and the colony was suspended till 1610, when Baron Poutrincourt took possession of the houses built in 1604. In 1613 the French colonists were expelled by settlers from Virginia, who claimed the country by right of discovery. The fort was then destroyed by Argal, afterwards deputy governor of Virginia. Under the French settlers it bore the name Acadia (Acadie): but its name was changed for its present one 1621, when a grant of the peninsula was obtained from James I., by Sir William Alexander, whose intention was to colonize the whole country. Having found, however, that the localities which they had chosen as suitable for settlement were already occupied, the colonists returned to the mother-country. In 1628 Port Royal was captured by the English under Sir David Kirk, but in 1632 was restored to France. In 1654, the French, who had regained footing in the colony, were subdued by a force sent out by Cromwell. By the treaty of Breda, the country was ceded to the French 1667, but in 1710 Port Royal was finally conquered for England by Colonel Francis Nicholson and was restored to the English 1713 by the treaty of Utrecht. After the middle of the 18th c., strenuous efforts were made to advance the interests of the colony. Settlers were sent out at the expense of the British govt. The Acadian French, who had been hostile to the English and had refused to take the oath of allegiance, were either expelled or completely mastered in 1755. In 1749 the town of Halifax was founded by an English colony under Col. Edward Cornwallis. In 1758 N. S. was granted a constitution with an elective assembly; in 1763 Cape Breton and Prince Edward Island were annexed but in 1770 the latter was separated. In 1754 New Brunswick and Cape Breton were separated from N. S. but in 1820 Cape Breton was reunited with the province. In 1848 responsible government was introduced. N. S. was incorporated with the Dominion of Canada in 1867. The population of the province in 1901 was 459,574, of whom 162,141 were reckoned as of English descent, 142,207 as Scotch, 55,830 as Irish, 45,067 as French, and 38,854 as German. Pop. (1907) about 460,000. Consult Dawson, *Acadian Geology* (1868); Calkin, *School Histories and Geographies of Nova Scotia*; Murdoch, *History of Nova Scotia* (1867); Richard, *Acadia, Missing Links of a Lost Chapter in American History* (1894); Bourinot, *Builders of Nova Scotia* (1899); Parkman, *Montcalm and Wolfe* (1875); Brown, *History of the Island of Cape Breton* (1869); Campbell, *History of Nova Scotia* (1873); Haliburton, *Historical and Statistical Account of Nova Scotia* (1829); Eaton, *The Church of England in Nova Scotia*; Akins, *Selections from the Public Documents of Nova Scotia* (1869).

NOVATI, Francesco, *frân-chĕs'kō nō-vâ'tē*, Italian

philologist: b. Cremona, Italy, 1859. He was a professor of the Academy of Milan in 1883, and has since held professorships at Palermo and Genoa, returning to Milan in 1892. His frequent contributions to the scientific magazines have greatly furthered knowledge of philology, his chief attention being given to the study of the Renaissance. He has published *Studj critici e letterare* (1889).

NOVATIAN, n. *nō-vā'shĭ-ăn:* in *eccles. hist.*, one of the followers of *Novatian*, A.D. 250, who held that the lapsed should not be readmitted to church privileges, and that second marriages were unlawful. NOVA'TIANISM, n. *-ĭzm*, the opinions of the Novatians.

NOVATIAN, *nō-vā'shĭ-an:* a priest of the Rom. Church: b. abt. the beginning of 3d c.; the leader of a sect called after his name. The place and time of his birth are not known with certainty. N. had been a stoic philosopher, but after his arrival in Rome was converted to Christianity, and being seized with sudden illness while still a catechumen, received what was called *clinical* baptism; that is, baptism by sprinkling administered on a sick-bed, and without the solemn ceremonial. Such baptism was, in ordinary circumstances, an impediment to holy orders. Notwithstanding this irregular baptism, N. was promoted to orders by Fabian the Roman bishop; and soon afterward showed his weakness by flying during a persecution. At this time a controversy arose about the manner of dealing with the lapsed; that is, those who during persecution fell away from Christianity, and to save their lives offered sacrifice to idols. N. at first inclined to the milder side, but on the election of Cornelius to the Roman bishopric to which N. had aspired, and on Cornelius taking the indulgent course toward the lapsed, N., with Novatus and some other discontented priests of Carthage, opposed his authority, and eventually N. was chosen by a small party, and actually ordained bishop, in opposition to Cornelius. The party who espoused his cause was called by his name. They were confined mainly, in the first instance, to Rome and to Carthage, where a kindred conflict had arisen. They held that in the heinous crime of idolatry through fear of suffering or death, the church had no power to absolve the penitent; and therefore, though it does not appear that they excluded such sinners from all hope of heaven, yet they denied the lawfulness of re-admitting them to the communion of the church. This doctrine they extended at a later period to all grievous sins, of whatever character. N. may thus be regarded as the first antipope. The churches throughout Italy, Africa, and the East adhered to Cornelius; but the N. party set up bishops and established churches not only at Carthage, but at Constantinople, Alexandria, Nicomedia, Phrygia, Gaul, Spain, and elsewhere. They claimed for themselves a character of especial purity, and assumed the appellation of Cathari (Puritans). The time and manner of the death of N. is uncertain. According to Socrates (*Hist. Ecc.* iv. 28; v. 21; vii. 5, 12, 25), he died a martyr in the persecution of Valerian, but this is improbable. He was a man of

considerable learning, and the work recently discovered in one of the monasteries of Mount Athos (*Origenis Philosophumena*, Oxford, 1851) is by some aseribed to him. His sect survived long after his death. An unsuccessful effort was made in the council of Nice to re-unite them to the church; and traces of them are discoverable as late as the end of the 6th century.

NOVATION, n. *nō-vā'shŭn* [F. *novation*—from L. *novatĭōnem*, newness—from *novus*, new]: in *law*, the substitution of a new obligation for another, which operates to the extinction of the latter; in *OE.*, something new; an innovation. N. is the substitution of a new obligation for an existing one; the debtor is discharged from his original liability by assuming a new liability to a new creditor by the order of his original creditor. Thus A owes B a sum of money; B owes C the same sum; B at the request of C directs A to pay C. If A consents to this, he is discharged from his obligation to B, and a new contract has come into existence between A and C, on which C may commence an action in his own name against A. The elements necessary are the consent of all the parties, the extinction of the old obligations, and the assumption of a new obligation by the original debtor to a new creditor. When N. occurs, the old rule that a personal contract could not be assigned so as to give the assignee a right of action in his own name, is not violated; because no assignment of the contract takes place; the old contract is extinguished and a new contract is made; the whole transaction is governed by the rules applicable to contracts. There must be a promise and a consideration for the promise. The promise is to pay the debt to the new creditor; and the consideration is the extinguishment of the original debts. If either this promise or this consideration is lacking, the transaction would be merely an assignment of a contract or an order to pay which would be revocable at any time by the old creditor, and the new creditor, under the old rule of law, could not prosecute an action in his own name to enforce the contract; but when all parties have assented to the new agreement, the old debt is discharged and the order is irrevocable. This term N. is extremely technical and has not been much used either in English or American law; but the transaction itself is frequent. When a mortgager conveys the mortgaged premises, and his grantee agrees to assume and pay the mortgage debt, and the mortgagee accepts him as a debtor, a N. results: or when a new firm takes upon itself the liabilities of the old firm, and the creditor, with knowledge of that fact, agrees to accept the new firm as a debtor and to release the old firm, a N. takes place. The release of the old debt by the new creditor may be inferred by the acceptance of interest, as in the case of the mortgagee, or by the receiving of new notes for the liabilities of the old firm, as in the case of the new partnership. Where, however, the amount, the terms and mode of payment of the debt, the rate of interest, and nature of the securities are changed, no N. takes place, unless all the parties clearly express that a N. shall take place.

NOVA ZEMBLA, *nō'va zĕm bla* (Russ. *Nowaja Zemlja*, New Land): chain of islands in the Arctic Ocean (lat. between 70° 30′ and 76° 30′ n., and long. between 52° and 66° e.), and included within the Russian govt. of Archangel: length of the chain, 600 m.; average breadth, 60 m.; 40,000 sq. m. The most southern island—a large island—is especially called Nova Zembla; of the others, which are small the principal are Matthew's Land and Lütke's Land. They were discovered 1553, and are wild, rocky, and desolate—the vegetation being chiefly moss, lichens, and a few shrubs. The highest point in the chain is about 5,000 ft. above sea-level. Mean temperature in summer, at the s. extremity, 35·51°; in winter, 3·21°. Nova Zembla has no permanent inhabitants, and the interior is nearly unknown; but as the coasts swarm with whales and walruses, and the interior with bears, reindeers, and foxes, the islands are periodically frequented by fishermen and hunters. See Markham's *Polar Reconnaissance* (1881).

NOVEL, n. *nŏv'ĕl* [OF. *novel*, new; F. *nouvelle*, news —from mid. L. *novella*, a new thing: L. *novellus*, very young—from *novus*, new]: a tale or narrative professing to give a picture of human life in some of its aspects, particularly the natural workings of the human heart; a fiction (see NOVELS AND ROMANCES): ADJ. new; unusual; strange; of recent origin or introduction. NOVELS, a part of the Justinian law. NOVELETTE, n. *nŏv'él-ĕt* [dim. of *novel*]: a short tale or story. NOV'ELIST, n. *-ĭst*, a writer of novels. NOV'ELTY, n. *-tĭ*, a new or strange thing; recentness of origin.—SYN. of 'novel, a.': recent; fresh; modern; rare.

NOVELETTE: in music a term denoting certain compositions in free form, characterized by a great number of short themes introduced without regular succession.

NOVELLÆ. See JUSTINIAN.

NOVELLO, *no-vĕl'lō*, CLARA: vocalist: b. 1818; d. 1908, March 16; daughter of Vincent N. Her talent showed itself very early. At the age of ten she became a pupil of the French Acad. of Singing for Church Music, studied in Paris several years, and afterward in Italy and Germany. In England and in Italy, 1840-48, she created quite a *furore:* her singing has indeed hardly been rivalled in equality, flexibility, and executive skill. In 1848 she married Count Gigliucci, and quitted the stage, returning to it 1850-60.

NOVEL'LO, VINCENT: musical performer and composer: 1781, Sep. 6—1861, Aug. 9; b. London, of an Italian father and English mother. At the age of 16 he was organist in the chapel of the Portuguese embassy; and even then had attained much of his famous proficiency on the organ. He was one of the founders of the Philharmonic Soc. His musical compositions, very numerous, chiefly sacred, are considered to have contributed much to improve cathedral music.

NOVELS AND ROMANCES.

NOV'ELS AND ROMAN'CES. narratives, more or les, fictitious, aiming to picture human life or character. The novel and the so-called romance, inasmuch as they constantly merge into one another, and are only superficially distinguished by the preponderance in the novel of ordinary and familiar incidents, in the romance of incident more or less remote and marvellous, may conveniently be included here under the common definition of prose narrative fiction. The legendary epic, the drama into which portions of its available material become crystallized from their fluent form, and the wider prose fiction or novel into which the drama expands itself, have obvious affinities with one another; the distinctions being rather of form than of essence. It is of the later development, the novel with its allied romance, that a historical sketch is here given, omitting the remoter and slightly known specimens produced in Hindustan and China.

1. *Ancient Classical Prose Fiction.*—The earliest known Greek compositions in fiction are the *Milesiaca*, or *Milesian Tales*, said to have been written chiefly by one Aristides. The Milesians were a colony of Ionic Greeks who settled in Asia Minor, and fell under the dominion of the Persians B.C. 494. They were a voluptuous, brilliant, and inventive race, and are supposed to have caught from their Eastern masters, whom they somewhat resembled, a liking for that particularly oriental species of literature—the imaginary story or narrative. None of the Milesian Tales are extant, either in the original Greek or in the Latin version made by Sisenna, the Roman historian, about the time of Marius and Sulla; but we have about 40 stories by Parthenius Nicæas, supposed adaptations from them. The collection of Parthenius is entitled *Peri Erotikōn Pathēmatōn*, and is dedicated to Cornelius Gallus, the Latin poet, contemporary and friend of Virgil. Judging from this later set of fictions, concerned mainly with the description of all sorts of seduction, of criminal and incestuous passions, and of deplorable terminations to wretched lives, there is little cause, either morally or æsthetically, to regret the loss of their more famous prototypes. In Greece Proper, nothing was done, so far as we know, in the way of novel or romance, until after the age of Alexander the Great. It has been conjectured, not improbably, that his Eastern conquests had a potent effect in giving this new bent to the fancy of his countrymen. Clearchus, disciple of Aristotle, wrote a history of fictitious love-adventures, and was, perhaps, the first European Greek novelist, and the first of the long series of *Erotikoi*, who reach down to the 13th c. after Christ. Not long after him came Antonius Diogenes, whose romance in 24 books, entitled *Ta hyper Thoulen Apista* (Of the Incredible Things beyond Thule), was founded on the wanderings, adventures, and loves of Dinias and Dercyllis. It appears to have been held in high esteem, and was at least useful as a store-house, whence later writers, such as Achilles Tatius, derived materials for their more artistic fictions. The work has not been preserved, but Photius gives an outline of its contents in *Bibliotheca Cod.*

An interval of several centuries elapses before another Greek novelist or romancist appears. Be the cause of this what it may, the ever-increasing luxury and depravity of the pagan imperial world combined to develop and intensify that morbid craving for horrible, magical, and supernatural incidents which in general fill the pages of the romancists of the empire. The first names in the new series are Lucius of Patra (*Patrensis*) and Lucian (q.v.), in the 2d c. after Christ, during the reign of Marcus Antoninus; but as Lucius simply collected accounts of magical transformations (*Metamorphoses*), he is perhaps not to be regarded as a novelist at all; while Lucian was really a humorist, satirist, and moralist in the guise of a story-teller—in a word, a classic Rabelais and Heine, and as far as possible from the wonder-loving school of Erotics, with whom he has only an incidental connection by the external form of some of his writings. The first of the new series of romance writers, strictly so called, is Iamblichus (*not* the Neo-Platonic philosopher), whose *Babylonica* is, indeed, no longer extant; but a fair estimate may be formed of it from the epitome of Photius. The next notable name is Heliodorus (q.v.), Bp. of Trikka, 4th c. This Christian writer, whose *Loves of Theagenes and Charicleia* is really the oldest extant *erotic* romance, has far excelled all his predecessors in everything that can render a story interesting or excellent, and his charming fiction obtained great popularity among such as could read. Some imagine that they see in Heliodorus a resemblance to the minutely descriptive style of novel introduced into England by Richardson; but without adopting this rather extreme notion, it can at least be safely asserted that Achilles Tatius and all the subsequent *Erotikoi* deliberately imitated his style and manner; and that he was used as a model by that formerly celebrated but dreadfully tedious school of heroic romance which flourished in France during the 17th c., and whose best-remembered representative is Mademoiselle de Scudéri. Tasso, Guarini, D'Urfé, and several other modern writers, have drawn many particulars—sometimes almost *verbatim*—from the stories in the *Theagenes and Charicleia*. Achilles Tatius (q.v.), belonging probably to the 5th c., ranks next to, but at some distance from, Heliodorus in merit. His romance, *Ta kata Leukippen kai Kleitophonta*, consisting of eight books, has supplied incidents to more than one Italian and French writer.

The work next in time that invites our attention, *Daphnis and Chloe*, by Longus, is of totally different character. It is a simple and picturesque prose-pastoral, with no poisonings, murders, magic, supernaturalism, and impossible exploits. Over the whole story rest a rural peace and a smile of sunshine; and in spite of some singularly polluted passages, it was, for its time, a pure and wholesome fiction. *Daphnis and Chloe* is the only pastoral romance produced by any Byzantine author. Whether or not it exercised any influence on the development of the *modern* pastoral of Italy and France, cannot be proved; but it

has been noticed that there is no slight resemblance between it and the story of the *Gentle Shepherd*, which we know was suggested to Allan Ramsay by a classical friend, who may have borrowed from the Greek the sketch which he gave to the poet. It has also been very closely imitated by Gessner in his idyl of *Daphnis*.

After Longus comes Chariton (lived some time between the 6th and 9th c.), whose romance, in eight books, on the *Loves of Chæreas and Callirrhoë*, is nearly complete. It contains, like the other erotic fictions, plenty of stirring and startling adventures, but on the whole less improbable than those in the writings of his predecessors. Of three Xenophons, also noted among the *Erotikoi*, and of uncertain date, the best is Xenophon of Ephesus, whose romance *Ephesiaca, or the Loves of Anthia and Abrocomas*, in ten books, has all the sensational characteristics of the school to which it belongs. It is noticeable that in the romance of Xenophon is found for the first time the story of the love-potion, the pretended death, and the mock-entombment of the heroine, which forms the leading incident in Shakespeare's *Romeo and Juliet*, and which, it is thought, reached the great English dramatist at second or third hand, through the Italian novelist, Luigi da Porta.

Again, a long interval elapses before appears another love-fiction of the old pagan sort. During this period, however, a work was produced, essentially a romance, expressly aimed to recommend that form of Christian life favorite in early times—the ascetic and recluse form. This was the *Barlaam and Josaphat* (q.v.), the author of which is unknown, but whose popularity, during the middle ages, may be estimated from the fact that it was translated into every language of Christendom from Norway to Spain. In the 12th c., another erotic Eustathius or Eumathius, properly the last of the series, published *Ismene and Ismenias*, in 11 books—a feeble performance, the expiring flicker of a lamp whose oil is nearly gone. It is puerile in delineation of character, and full of plagiarisms; yet many of its details have been copied by later occidental writers, e.g., D'Urfé and Montemayor.

In all the erotic romances, the adventures, which constitute the story, have certain common characteristics. The hero and heroine are generally carried off by robbers or pirates; or they flee from home, and are accidentally separated. They resolve to seek each other throughout the world, and in the course of their loving quest they visit the remotest regions, encounter the most frightful perils, make hairbreadth escapes from tragic ends, meet again in most unexpected and miraculous ways, and generally close their career in happiness and splendid prosperity—often turning out to be the offspring of far greater people than they imagined. Copious use is made of poisons, love-potions, improbable tricks, magic instruments, etc.; and one can easily see that the stories were meant to tickle and stimulate a languid, corrupt, sensual, and credulous people, like the Greeks of the Lower Empire.

Before touching on the mediæval romance of western

Europe, we may briefly notice such specimens of classical fiction as exist or are known to have existed in Latin. Sisenna, who translated the Milesian Tales into Latin, derived his knowledge of them from the Sybarites, a Greek colony of Lower Italy. The taste for similar stories increased during the empire, but the writers in general cannot have displayed much genius, if we may judge from the contemptuous language used by Emperor Severus against Clodius Albinus, whose fictions he designates *ludicra literaria*, and *anilia* (old wives' tales). But higher praise must be assigned to the work commonly attributed to Petronius Arbiter (q.v.), who lived in the time of Nero, and whose *Satyricon*—incomplete—is a comic novel or romance, and (though the dirtiest work in even pagan literature) is executed with skill, vigor, and at times with beauty. In the 2d c. after Christ, Appuleius (q.v.) wrote his *Ass* (called from its excellence the *Golden Ass*), which relates the adventures of a young man who had the misfortune to be accidentally metamorphosed into that animal, while sojourning in Thessaly, retaining, however, his human consciousness. The miseries which he suffers at the hands of robbers, eunuchs, magistrates, and other persons into whose hands he falls, until the period when he is enabled to resume his former figure, are portrayed with a wit, humor, and fancy scarcely inferior to Lucian. The work is believed to have had also, like the writings of his Greek contemporary, a moral and satirical aim. It was immensely popular in the middle ages, supplied Boccaccio with some of his stories, and the author of *Gil Blas* with the picturesque incidents of the robbers' cave in the early part of *his* romance, and contains in the episode of *Cupid and Psyche* one of the loveliest allegories of classical antiquity.

2. *Romantic Fiction in Western Europe.*—The first thing to be clearly understood in connection with this branch of literature is, that it is *not* a continuation of the Græco-Byzantine or classical fiction, though, strangely, it began to spring up in the West when the other was dying out in the East. It is a completely new growth, product of new historical circumstances, which were but very slightly affected by Byzantine influences of any kind; and it transports us into a world of ideas, sentiments, beliefs, and actions, as different from what we find in the *Erotikoi* as could be imagined. In the old fiction, the principal characters are mere lovers *forced* into adventures by the ministers of fate; in the later fiction, they are real heroes of the old Homeric type, and *seek* dangers greedily and joyously. When we read the *Erotikoi*, we are reminded in many ways that we are in the midst of a corrupt and decaying civilization; when we turn to the romances of chivalry, in spite of certain superficial and barbarous vices, such as the prevalence of bastardy and the indifference to bloodshed, we feel that we are in the presence of a youthful, healthy, vigorous, and growing social life. That these romances, generally from beginning to end, consist of a series of extraordinary and utterly impossible exploits, in which the magic, the mystery, and the enchantments of

the *Arabian Nights* are rivalled or outshone, is unquestionable; but this proves no more than that the races of western Europe, who slowly, during the dark ages, were rising, by the help of the church, out of barbarism into feudalism—the first step toward the civilization of the modern world—were boundlessly ignorant, credulous, and wonder-loving. Their prodigious vigor and vehemence of character, having no proper intellectual *pabulum*, was forced to supply its craving for a knowledge beyond its immediate attainment by the exaggerations of a fancy that knew neither law nor limit. It is going too far to assert that, in the mediæval romance, everything is of native or 'Gothic' origin; the fact is very much the reverse. This extreme theory, propounded by Mallet and supported by Bp. Percy and other writers, is inadequate to account for all that is contained in these romances. Not less inadequate is another theory, suggested first by Salmasius, afterward elaborated by Warton, that the mediæval romance is mainly of Saracenic origin, and was introduced probably by the Moorish conquerors into Spain, and thence propagated into France and Britain; while a third theory, which has found supporters, viz., that it was derived from the classical mythology of ancient Greece, is the most inadequate of all. The true explanation appears to be, that mediæval romance had its root and foundation in Chivalry (q.v.)—a genuine product of western Europe—and though the machinery, the exploits and the marvels, may have often been derived from the foreign sources mentioned, yet the spirit, scenery, sentiment, and life of the legends thoroughly reflect the characteristics of the earlier ages of feudalism. The notions of dragons, giants, magic rings, enchanted castles, are probably of Saracenic origin, and may have been introduced into Europe by the horde of pilgrims who visited the East in the time of the Crusades; such incidents as the detaining of a knight from his quest by the enchantments of a sorceress may have been a tradition of the *Odyssey* of Homer; but the gallantry, the courtesy, the romantic valor, the tournaments, the noble friendships of brother-knights—all that distinguishes the romances of chivalry, from Runic legends or the *Arabian Nights*, cannot be traced to any other source than the new-born chivalry of Europe.

The mediæval romances are divisible into three great series: 1. Those relating to Arthur and the Knights of the Round Table; 2. Those relating to Charlemagne and his Paladins; 3. Those relating to Amadis de Gaul and his descendants.

The Arthurian series is, in its essence, of Welsh and Armoric origin. Its genesis is as follows. First came the legendary chronicles composed in Wales or Brittany, such as the *De Excidio Britanniæ* of Gildas (q.v.); the chronicle of Nennius, belonging to the 9th c.; the Armoric collections of Walter Calenius or Gualtier, Archdeacon of Oxford; and the famous *Chronicon sive Historia Britonum* of Geoffrey of Monmouth (q.v.)—from these, and from the multitude of floating unrecorded traditions, sprang the

metrical, which in turn gave birth to, and were ultimately superseded by, the *prose* romances. With the latter alone we have here to do. They, like the metrical romances, were composed in the 13th, 14th, and 15th c. by Anglo-Norman authors (whose names are unknown), who took all the more willingly to the old British legends, since in these the 'Saxons' were objects of the authors' hatred and detestation. The principal romances of the Arthurian cycle are those of *Merlin* (q.v.), the enchanter; of *Arthur* (q.v.); of the Sangreal (see GRAAL); of *Perceval;* of *Lancelot du Lac;* of the princes of Lyonnesse, *Meliadus* and his son *Tristan;* and of *Isaie le Triste,* son of Tristan. They relate the marvellous adventures, exploits, loves, and gallantries of the Knights of the Round Table, and are probably in substance the oldest of the mediæval prose romances. The scenes are generally laid in Wales, Cornwall, Brittany, Ireland, or Scotland; only in one or two of the series are we taken as far as Egypt or India; and though Arthur is slain by 'Saracens' who supported his nephew, Mordred, and a general Eastern coloring is present in the cycle, yet it is 'Saxons' who are his principal foes.

The series of Charlemagne and his Paladins is of purely French origin, and originated in a somewhat similar fashion to the Arthurian cycle; i.e., there was first a legendary chronicle (in verse), *Historia de Vita Caroli Magni et Rolandi,* erroneously attributed to Turpin or Tilpin, Abp. of Rheims, contemporary of Charlemagne, but dating probably in the 11th or 12th c.; then came a series of metrical romances, strictly so called, gradually supplanted by their prose counterparts, the authors of which last, however, appear to have diverged more from the metrical originals and to have been more free and fanciful than their predecessors of the Arthurian cycle. The principal are *Huon of Bordeaux* (the incidents of which are followed by Wieland in *Oberon*), *Guerin de Monglave, Gaylen Rhetoré* (in which Charlemagne and his Paladins proceed *incognito* to the Holy Land), *Miles and Ames, Jourdain de Blaves, Doolin de Mayence, Ogier le Danois,* and *Maugis the Enchanter.* In these romances we are, in some respects, on different ground from that in the Arthurian series. We are transferred to the East—to Africa, Palestine, Arabia, Bagdad, Constantinople, India, Persia, the Caspian Sea, etc. We are introduced to the courts of Saracen 'princes,' 'sultans,' and 'emirs;' and see Mohammedan maidens of peerless beauty falling in love with Christian knights, and for their sakes abandoning, even betraying, father, mother, brethren, and kinsmen. Fairies, who figure but slightly in the Arthurian romances, play a frequent and important part in these; demons, dervishes, apes, talismans, palaces with cupolas and gilded roofs, splendid jewels, diamonds, etc.—everything, in fact, shows the influence exercised on the imagination of western Europe by the glowing scenery, the brilliant life, and the gorgeously fanciful superstitions of oriental lands.

For the series relating to Amadis de Gaul and his descendants, see AMADIS. It is a proof of the comparative

lateness of their composition, that the 'Saracens' of the French romances here give place to 'Turks;' and as the eyes of Europe were turned toward the tottering Greek empire, many of the scenes of warfare are laid at Constantinople.

Besides the three distinct series of romance above mentioned, a fourth may be noted, in which the heroes of antiquity are grotesquely tricked out in the costume of mediæval knights. The exact date of their composition cannot be ascertained, but in general they were probably later than any of the other three series; and, at any rate, were for the most part not published till the end of the 15th and the beginning of the 16th c. The principal are the romance of *Jason and Medea*, of *Hercules*, of *Œdipus*, and of *Alexander*. They are in French, and the first two profess to be the work of a Raoul le Febre. An attempt is made to adhere, in the general outline of the stories, to the ancient myths, but most marvellous embellishments are added, such as only the middle ages could have conceived; while the transformations that the classical personages undergo are exceedingly ludicrous. Jove becomes a 'king;' Mercury, his 'squire;' the Fates, 'duennas;' Cerberus and the Sphinx, 'giants;' etc.

Though the romances of chivalry may appear utterly tedious and absurd to a modern reader, they were immensely relished and admired during the ages in which they were produced, were widely circulated, in different forms, throughout Christendom, and were highly popular with later poets. The influence which they exercised on Pulci, Boiardo, Tasso, Spenser, etc., shows the strong hold that they must have had on the imagination of Europe; but with the decline of chivalry, the spread of the more rational and artistic fictions of the Italian novelists, the revival of letters, and the general advancement in civilization, the taste for the romances of chivalry declined, until finally, early in the 17th c., Cervantes laughed them out of literature, and well-nigh out of memory.

3. *Development and Influence of Fiction in Italy.*—The Italians originated no romances of the kind described above. This resulted from various causes, principally perhaps the following: 1st, that they were really not a Gothic, but at least a semi-classic people; 2d, that they were by inheritance more polished in taste than the northern nations; 3d, that instead of feudal chivalric institutions, the most characteristic *political* features of Italy, during the middle ages, were mercantile and lettered republics. There was what may be roughly called a *middle class*—of merchants—in Italy, when England and France and Spain contained really little more than nobles and serfs; and these merchants were really the best instructed and the most enlightened portion of the community. Hence it is natural that we should find a style of fiction mirroring this more civilized and sober form of social life. That the classical romances had some influence on the development of Italian fiction, is probable; several of the tales recorded in the love-letters of Aristenetus, and in the

Golden Ass of Appuleius, are quite like what we read in Boccaccio and others. The fables of Pilpai or Bidpai (q.v.), translated into Latin as early as the 13th c., also were not without effect; but it is to the Arabico-Indian book of the seven counselors (better known as *The Tales of the Seven Wise Masters*), still more to the stories of Petrus Alphonsus (whose work is entitled *De Clericale Disciplina*), and the *Gesta Romanorum* (q.v.), a grotesque jumble of classical stories, Arabian apologues, and monkish legends, in the disguise of romantic fiction; but most of all perhaps to the *Contes* and *Fabliaux* (q.v.) of the French poets, that we must look for the sources of those almost innumerable *novelletti* which mark the earlier literary history of Italy.

The earliest Italian work of this sort is the *Cento Novelle Antiche*, commonly called *Il Novellino*. It is a compilation by different hands—all unknown—of stories floating about, or taken with modifications from the sources above mentioned, with one or two of the more graceful episodes in the romances of chivalry, and was executed toward the close of the 13th c. It was followed 1358 by the *Decameron* of Boccaccio (q.v.)—the finest, in humor, sentiment, and style, of the whole set, but not more original in story than *Il Novellino*. The influence of the *Decameron* on early European literature was prodigious. Chaucer and Shakespeare in particular were greatly indebted to it for incidents and plots; while in France—from whose Trouvères Boccaccio himself had derived so much—he had a number of distinguished imitators. In his own country, his influence was so overwhelming that for centuries Italian novelists could do nothing more than attempt to copy him. The principal of these imitators are Franco Sacchetti (1335–1410), Ser Giovanni (who began to write his novelletti 1378, from which Molière got the plot of *École des Femmes*, and Shakespeare probably part of his story of the *Merchant of Venice*—though the story of the bond is far older, and is of Persian origin: Chaucer also is indebted to this Italian); Massuccio di Salerno (about 1470), more original than most of the post-Boccaccian novelists; Sabadino delli Arienti (about 1483), Agnolo Firenzuolo; Luigi da Porta; Molza, and Giovanni Brevio (at the close of the 15th, and in the first half of the 16th c.); Girolamo Parabosco (1550); Marco Cademoste da Lodi (1544); and Giovanni Giraldi Cinthio (d. 1573), noted particularly for extravagant employment of sanguinary incidents, and introduction of scenes of incredible atrocity and accumulated horrors. The seventh of his third decade of stories contains the story of *Othello, the Moor of Venice:* the plot of *Measure for Measure* also was derived indirectly from him. Cinthio was, in fact, the greatest favorite of all the Italian novelists with the Elizabethan dramatists. Besides these, were Antonio Francesco Grazzini (d. 1583); Straparolo (wrote 1554 *et seq.*), from whom Molière, also the French writers of fairy tales, derived numerous hints; while the ludicrous incident embodied in the Scottish song of *The barrin' o' our door*, forms one of the stories of this writer; Bandello (d. 1555), the

most widely known and read (out of Italy) of all the Italian novelists after Boccaccio, and in whom we find the original of Massinger's play of *The Picture*, and of Shakespeare's *Twelfth Night;* Granucci (pub. 1574); Malespini (pub. 1609); and Campeggi (early part of 17th c.).—The best French imitations of these Italian tales are *Cent Nouvelles Nouvelles* (printed 1456, transl. into English under the title *Hundreth Mery Tayles*, 1557), full of life, gayety, and imagination; and the *Heptameron* of Margaret, Queen of Navarre, from which Shirley, the English dramatist, took the plots of two of his comedies.

A few words in passing may be given to a very different class of fiction—the *Spiritual Romance.* It originated, without doubt, in the bosom of the church, and from the desire to edify, by stories of religious knight-errantry, a rude and ignorant community, incapable of receiving or relishing abstract doctrines. The first of the series is *Barlaam and Josaphat*, above alluded to; but by far the greatest work of the kind during the middle ages is the *Legenda Aurea*, or Golden Legend (q.v.)—itself believed to be drawn from different and now partly forgotten sources. Besides these, a species of spiritual tale—the *Contes Dévots*, was prevalent in France during the 12th and 13th c., written by monks, perhaps to counteract, perhaps in part to compete with, the witty and licentious stories of the Trouvères; but strangely, in these pious fictions the lives of monks and nuns are represented as far more immoral than in the fictions of the secular satirists. The things, too, which the Virgin Mary is represented as doing are most astounding, and throw a strange but valuable light upon the religious notions of the age. In one story, she conceals the shame of a favorite nun; in another, she performs the part of a procuress; in a third, she officiates as midwife to an abbess who had been frail and imprudent; and in general, she performs the most degrading offices for the most worthless characters.

Romance of the 16th and 17th Centuries.—During the middle ages, the universal sway of the church and the institutions of feudalism gave a certain uniformity to the modes of life, and thereby to the social literature of w. Europe; but after the epoch of the Reformation, and even earlier, this uniformity disappears, and we find in every direction a tendency to the opposite extreme of individualism. This tendency manifests itself especially in the fiction of the period, which vastly increasing in quantity and varying in quality, becomes difficult to classify; but the endeavor is here made to group the products of modern prose-fiction works under what appears convenient chronological heading.

During the 16th and 17th centuries, four different kinds of romance or novel were cultivated—1. *The Comic Romance;* 2. *The Political Romance;* 3. *The Pastoral Romance;* 4. *The Heroic Romance.*

Comic Romance substantially begins in modern times with Rabelais (q.v.), styled by Sir William Temple the *Father of Ridicule.* Others, indeed, had preceded him in the

same path, but they had acquired no celebrity. In him we see unmistakably one form of the modern spirit—its daring freedom of speculation, criticism, and satire, also that lack of reverence exhibited by those who, at the period of the Reformation, clearly discerned the abuses of the church, but had not faith in the possibility or efficacy of reforms. Thus, Rabelais, in his inimitable burlesque romance, scoffs—with the tone of a skeptic, however—at the vices of the clergy, the crooked ways of politicians, the jargon of philosophers, and the absurdities of the *contes dévots* and of the mediæval tales generally. The next remarkable romance of a comic nature is the *Vita di Bertoldo* of Julio Cesare Croce (at the close of the 16th c.), a work recounting the humorous and successful exploits of a clever but ugly peasant; and regarding which we are told that for two centuries it was as popular in Italy as *Robinson Crusoe* or the *Pilgrim's Progress* in England. The substance of the story can be traced back to an oriental source. A few years later appeared *Don Quixote* (see CERVANTES), in which 'war to the knife' was opened against the romances of chivalry, and in which, perhaps, we see, more distinctly than in any other fiction of the period, the new *turn* that the mind of western Europe had taken. Almost contemporaneous with *Don Quixote* was another Spanish romance—Matteo Aleman's *Life of Guzman Alfarache*, successively beggar, swindler, pander, student, and galley-slave. In this work, as in others of the same sort, we find several indications of the influence of the Italian novelists. It has been supposed that *Guzman Alfarache* suggested to Le Sage the idea of *Gil Blas*, and there *is* some resemblance between the two; but, at any rate, it gave birth to a host of Spanish romances with beggars and scamps for heroes, of which the best is the *Lazarillo de Tormes*, by Diego de Mendoza (1586). In the following century, France produced, among others, Scarron's *Roman Comique*, and Furetiere's *Roman Bourgeois*. England and Germany have nothing to show in this department.

Political Romance was manifestly suggested partly by the great politico-ecclesiastical changes in Europe in the first half of the 16th c., partly by the immense increase in the knowledge of the manners and customs of remote nations, occasioned by geographical discoveries and mercantile adventure. The earliest of the series is the *Utopia* of Sir Thomas More; next comes the *Argenis* of Barclay, pub. 1621; and to the same class belong a variety of French romances produced about the close of the 17th and the beginning of the 18th c., of which by far the most famous is the *Télémaque* of Fénelon.

Pastoral Romance.—All through the middle ages, the fame of Virgil kept up a certain interest in compositions aiming to delineate rustic or shepherd life. We find in even the poems of the Troubadours several specimens of the erotic pastoral; and the *Ameto* of Boccaccio furnishes a prose illustration of the same. But it was after the revival of letters that this branch of fiction, so essentially classical,

was most assiduously cultivated by men of scholarly genius; and though their works have not retained their original popularity, they are still interesting and valuable from a historical point of view, and abound in descriptive passages of great beauty and sweetness. The pastoral life which they portray, however, never existed either in Greece or elsewhere. Their shepherds and shepherdesses are as unreal and unhistorical beings as the knights of mediæval romance. The first important work of the kind is the *Arcadia* of Sannazzaro, in Italian, about the end of the 15th c. It was followed by the *Diana* of Montemayor, in Spanish, about the middle of the 16th c., several of the episodes of which are borrowed from the Italian novelists; while Shakespeare also has directly taken from it the plot of the *Two Gentlemen of Verona*, copying occasionally the very language, as well as some of the most amusing incidents in his *Midsummer Night's Dream*. The *Diana* was imitated in French by Honore d'Urfé, whose *Astrée* (1610–25) was long held in the highest esteem, and is really, in spite of its tediousness, a work of great learning and considerable merit. Twenty years before the appearance of *Astrée*, Sir Philip Sidney wrote and published his *Arcadia*, as tiresome, and in its substance as unreal, as any production of the same school, but in stateliness and melody of language, in luxury of fancy, in nobility and purity of sentiment, far exceeding them all.

Heroic Romance owed its origin partly to the immediate antecedent pastoral romance, partly to an increased acquaintance with classic history, produced by the translation of such books as *Plutarch's Lives;* and partly to the interest excited in the Moors of Granada by a splendid romance in Spanish (professing, however, to be a *history*), entitled *The Dissensions of the Zegris and the Abencerrages*, printed at Alcala 1604, and which soon became extremely popular, especially in France. It was in the latter country alone that the *Romans de Longue Haleine* (Long-winded Romances), as they have been happily nicknamed, were cultivated. The first of this heavy series was the *Polexandre* of Gomberville, pub. 1632, in which the influence of the early Greek romances is visible. His successor, Calprenede, the best of a bad lot, wrote *Cleopatra, Cassandra*, and *Pharamond*. But the most prolific, and consequently the most intolerable of the school, is Madame de Scudéri, whose principal romances are *Ibrahim ou l'Illustre Bassa, Clelie, Histoire Romaine, Artamenes ou le Grand Cyrus*, and *Almahide*. The pompous dignity, the hyper-polite address, the dreadful dulness, and the hollow ceremonialism of these ridiculous performances, admirably though unintentionally mirror the features of French court-life during the time of the *Grand Monarque*. The heroic romances did not long retain their meretricious reputation. Molière, and still more, Boileau in his satire *Les Héros de Roman, Dialogue*, ridiculed them to death, and consequently, Madame de Scudéri had no successor.

Novels and Romances of the 18th Century.—The two European nations that most brilliantly distinguished

themselves in the department of fiction during this century were England and France, to which chiefly this notice is confined.

1. *English Prose Fiction.*—During the age of Elizabeth and her immediate successors, the imaginative genius of England, from various causes, had taken an almost exclusively poetical direction; and with the exception of Sidney's pastoral of *Arcadia*, and Bunyan's *Pilgrim's Progress*, we meet with nothing in the shape of a novel or a romance for a hundred years. The 17th c. has nothing of the kind to show till it approaches its close. This is doubtless due, in part at least, to the intensity of the great political and religious struggle that agitated and rent England during the first half of that century, and gave an austere theological bias to society. The Puritans, in their day of triumph, would not tolerate either comic or heroic romances. They set their faces 'like flint' against all imaginative fiction, which they considered as little better than lying; and even till the second quarter of the 19th c., many of that class of people commonly described as 'the religious portion of the community,' in some sense the representatives of the Puritans, betrayed the legitimacy of their spiritual descent by their aversion to all sorts of secular tales. After the Restoration, however, an extraordinary change came over the English nation, or at least over the higher and wealthier classes. These rioted in the excess of a coarse and licentious reaction against the rigorous and sometimes fanatical piety of the Commonwealth. This turbid viciousness by and by calmed down, but it left a certain taint of sensualism and materialism in the habits and life of the people generally, which, in the opinion of some competent critics, marks them to this day. It is certain that at the beginning of the 18th c. England was entering on the most prosaic, unimaginative, and unheroic period of her history. Its characteristics are faithfully re-reflected in most of her novels, which, as pictures of the gross dull life, the paltry thoughts, the low sentiments, the modish manners, and the loose morality that prevailed, possess a great historical value apart altogether from their literary merits. The first name that occurs is that of the notorious *Aphra Behn* (q.v.), the greater number of whose novels, of which *Oronoko* is best known, appeared toward the close of the reign of Charles II., but are included here in the literature of the 18th c., as they belong by the nature of their contents to it, and not to the 17th c. types of fiction. She was imitated by Mrs. Heywood (1696–1758), of whose *Love in Excess*, *The British Recluse*, and *The Injured Husband*, it has been remarked, that 'the male characters are in the highest degree licentious, and the females as impassioned as the Saracen princesses in the Spanish romances of chivalry.' A later work, however, *The History of Miss Betsy Thoughtless*, is of higher stamp, and is supposed to have suggested the plan of Miss Burney's *Evelina*. But the first novelist of great genius belonging to the new era is Daniel De Foe (q.v.), father of modern English prose fiction, in whose writings—*The Ad-*

ventures of Captain Singleton, *The Fortunes of Moll Flanders*, *The History of Colonel Jack*, etc.—the coarse, homely, unpoetical, but vigorous *realism* of the time is strikingly apparent. Perhaps the Spanish ragamuffin romances may have furnished him some hints *Robinson Crusoe* is the finest and the most famous of all that class of fiction which was extensively cultivated both in France and in England during the earlier part of the 18th c., and which received, in the former country, the name *Voyages Imaginaires*. To the same class (outwardly at least) belong Swift's *Gulliver's Travels*, though at bottom this is a satirical romance, like the works of Rabelais; and the *Gaudentio di Lucca*, a sort of politico-geographical fiction, generally attributed to Bp. Berkeley. After De Foe comes Richardson (q.v.), very unlike any of the novelists of his age—to appearance! His Muse is a most decorous prude, and never utters anything rude, or vulgar, or licentious; but though she was inspired with the best intentions, her notions of how virtue should be rewarded indicate the coarseness of the time, hardly less than the debaucheries and seductions of Fielding and Smollett. The principal novels of Richardson are, *Pamela*, *Sir Charles Grandison*, and *Clarissa Harlowe*. Fielding (q.v.) thought Richardson untrue to nature, and wrote his first novel of *Joseph Andrews* as a burlesque on the style of his predecessor. Like his subsequent performances, *Tom Jones* and *Amelia*, it represents society as Fielding's sharper eyes saw it, on the whole, gross, vulgar, and impure. Smollett (q.v.), with a different style of genius, continues to paint in the same spirit. His chief works are, *Roderick Random*, *Peregrine Pickle*, *The Adventures of Ferdinand Count Fathom*, and *Humphry Clinker*. Sterne (q.v.), belonging to the same period, exhibits a genius so whimsical, peculiar, and original, that it is almost impossible to class him with any of his contemporaries. His *Tristram Shandy* is a work *sui generis*, but nowhere is the coarse impurity and indelicacy of the age more conspicuous. Four years later, appeared Goldsmith's *Vicar of Wakefield*, in which a change for the better, in a moral view, is first noticeable. With the exception of Richardson, all the novelists above mentioned are usually, and correctly, described as *humorists*. Other qualities they have besides, but humor is the most common and predominant. When this school was passing away about 1760–70, another was on the eve of being born. The publication of Percy's *Reliques* had re-awakened an interest in the age of chivalry and romance. Readers had become tired of the long prevalence of prosaic fiction, in spite of the splendid genius devoted to its illustration. It had done its work, and could create no more. The first of the modern romantic school was Horace Walpole, whose *Castle of Otranto* appeared 1769. He was followed by Clara Reeve, authoress of the *Old English Baron*, a romance that we might wish every school-boy to remember with gratitude; but the greatest genius in this line was undoubtedly Mrs. Radcliffe (q.v.), whose *Mysteries of Udolpho* and other works, though now almost forgotten were once greedily devoured

and abundantly imitated. The ablest of her successors were Matthew Gregory Lewis, author of *The Monk* (1796), and Maturin, author of *Montorio* (1803). In all the romances of this school, the incidents are of the most startling, terrible, and often supernatural character, and the scenery is in keeping with the incidents. Fierce barons, mysterious bandits, persecuted maidens, gloomy castles, secret passages, deep forests, murders, ghosts, haunted chambers, etc.; everything that could charm, by way of contrast, and pleasantly horrify the languid, matter-of-fact, skeptical 18th c., is found in their exaggerated pages.

A few novelists remain to be mentioned who are incapable of particular classification. These are Dr. John Moore (q.v.), author of *Zeluco*, etc.; Godwin (q.v.), author of *Caleb Williams*, *St. Leon*, etc., in whom the free-thinking and revolutionary spirit that seized many minds after 1789 is conspicuous; Mrs. Inchbald (*Nature and Art*, *A Simple Story*, etc.); Charlotte Smith (*Old Manor House*, etc.); Miss Austen (*Pride and Prejudice*, *Emma*, *Persuasion*); and Maria Edgeworth, whose sketches of Irish character first suggested to Walter Scott the idea of attempting for Scotland a series of like illustrations.

2. *French Prose Fiction in the 18th Century.*—It is not easy—perhaps not possible—to trace the causes that led to the cultivation of the different kinds of fiction which flourished in France during this century, particularly during the first half of it. The natural love of change—of novelty; the accidental influences of foreign literature; the disposition, so peculiarly French, to satirize prevalent follies and vices; the wish, on the other hand, to amuse the leisure moments of a luxurious, superstitious, and profligate society: all these and many other causes unquestionably assisted in determining its diverse development. Four kinds have been distinguished: 1. *Pseudo-historical Romance*, the literature in which department, though copious enough, neither deserves nor requires special notice; 2. *Romance in which the incidents, though natural, are purely imaginary;* 3. *Satirico-moral Romance;* 4. *Fairy Tales*, to which may be associated the imitations of *Oriental Tales*, and the *Voyages Imaginaires.*—We give attention to the last three kinds.

2. *Romance in which the incidents, though natural, are purely imaginary.*—This class more nearly corresponds with the modern conception of the novel than any of its predecessors, and probably had its prototype in *La Princesse de Clèves* and *Zaïde*, by the Comtesse de Lafayette, in the latter half of the 17th c.; but the first great name that adorns it is that of Marivaux (1688–1763), whose *Vie de Mariamne* and *Paysan Parvenu* were long in high favor. They have this in common with the contemporary English fiction, that everything in them is produced by ordinary means, and the interest of the reader is sought to be awakened by the vivid and powerful portraiture of natural feelings, while the incidents, though often highly romantic, are always sufficiently probable to insure the credence of the imagination. Next to Marivaux comes the Abbé

Prevot, q.v. (1697–1763), who first 'carried the terrors of tragedy into the novel.' He was a most voluminous writer; but the work by which chiefly he is now remembered is *Manon L'Escaut*, recounting the adventures of a kept-mistress and swindler, the purpose of which appears to be similar to that of *La Dame aux Camelias* of Dumas *fils* —viz., to show how noble, true-hearted, and self-sacrificing a prostitute may be! Other writers belonging more or less strictly to the same division are Madame Riccoboni (1750) and Rousseau (q.v.), in whose *Heloise* we see the dawn of that fierce natural impure passion, and that extravagant scorn of conventional life, that culminated in the sanguinary paroxysms of the Revolution.

3. *Humorous and Satirical Romance.*—By far the most celebrated specimens of this kind of fiction in France during the 18th c. are the *Gil Blas*, *Diable Boiteux*, and *Le Bachelier de Salamanque* of Le Sage, q.v. (1668–1746), all of which were suggested by the prolific comic romancists of Spain, Juan de Luna, Quevedo, Cervantes, Espinel, from some of whom, as well as from more ancient sources he borrowed, with hardly any variation, whole scenes and stories. The best parts, however, are his own, and the spirit of the work is thoroughly French in the gay and lightsome vivacity of its humor. It is with some hesitation that we place the younger Crebillon (q.v.) in the same category; for the licentiousness of his *Egarements du Cœur et de l'Esprit*, and other novels, is far more apparent than their satire or humor. Bastide and Diderot (q.v.) hold an equally doubtful position as satirists or humorists; but Voltaire (q.v.) may fairly claim to rank among the former, in virtue of his *Candide*, *Zadig*, *L'Ingénu*, *La Princesse de Babylone*, etc., most of which contain covert attacks on superstition and despotism, under the forms in which Voltaire best knew them. Voltaire, however, had not a rich imagination, and, in consequence, has been obliged to help himself liberally in the matter of incident from older writers.

Fairy Tales, etc.—A very careful inquiry might probably succeed in tracing back this kind of literature to the early intercourse of Christian and Moorish nations; but the first work in which we find definite examples of fairy tales is the *Nights* of the Italian novelist Straparola, translated into French 1585. In this collection are found at least the outlines of some of the best-known stories of the sort, such as *Le Chat Botté* (Puss in Boots), *Prince Marcassin*, *Blanchebelle* and *Fortunatus*. The immediate forerunner and prototype, however, of the French fairy tales was the *Pentamerone* of Signor Basile, written in the Neapolitan *patois*, pub. 1672. This work attracted and stimulated the fancy of M. Charles Perrault (q.v.), whose *Histoires ou Contes du Temps passé* appeared 1697, and is incomparably the most naïve and charming of all the collections of fairy tales. The titles of some of his *contes* will recall to some readers many a literary feast of childhood—*La Barbe Bleue* (Bluebeard), *La Belle au Bois Dormant* (The Sleeping Beauty, to which, by the by, Tennyson has given a poetic

immortality), *Le Chat Botté* (Puss in Boots), *Riquet à la Houppe* (Riquet with the Tuft), and *Le Petit Chaperon Rouge* (Little Red Riding Hood). The principal successors of Perrault were the Comtesse d'Aunoy (see AUNOY), Madame Murat, and Mademoiselle de la Force; but their stories are much more extravagant and forced than those of the illustrious academician. The same censure, however, is not applicable to *Les Contes Marines* (1740), by Madame Villeneuve, among which occurs the tale *La Belle et la Bête* (Beauty and the Beast), perhaps the most beautiful creation in the whole circle of this fantastic form of fiction.

Meanwhile, the translation of the *Arabian Nights' Entertainments* (q.v.) by Galland, 1704–17, and of numerous other Arabic and Persian works, the great encouragement extended to the literature of the East in the 17th and 18th c., the publication of the *Bibliothèque Orientale* of D'Herbelot, etc., created a taste for the brilliant exaggerations of oriental fiction, and a variety of works were soon in the field, swarming with necromancers, dervishes, caliphs, bashaws, viziers, cadis, eunuchs, slaves. The most notable are—*Les Mille et un Quart d'Heure, Contes Tartares; Les Contes Chinois, ou les Aventures Merveilleuses du Mandarin Fum-hoam;* and *Les Sultanes de Guzaratte, Contes Mongols*, of M. Gueulette.—Of the class of fictions known as *Voyages Imaginaires*, the principal are the *Histoire Comique des Estats et Empires de la Lune*, and the *Estats et Empires du Soleil* of Cyrano Bergerac, which materially influenced the genius of Swift, who has, in fact, borrowed not a little from the first of these in his *Gulliver's Travels*, and which were themselves suggested partly by the Spanish romance of Dominico Gonzales, *The Man in the Moon.* Such novels as *Paul et Virginie* of Bernardin St. Pierre, which appeared toward the end of the 18th c., do not come under any of the four heads, but may most conveniently be mentioned here.

Prose Fiction of Germany during the 18th and 19th Centuries.—The necessary brevity which admits only a superficial indication of the development of this branch of literature in Germany, is the less to be regretted, as, during the greater part of the 18th c., this branch did not attain much distinction. Toward the close of the century, however, writers became more numerous, and as the literary activity of many of them continued till the first or second quarter of the 19th c., it is most convenient and natural to treat both centuries together, as they, properly speaking, form only one era in the literary history of that nation.

The first eminent German novelist of this period was Wieland (q.v.), whose Greek romances, *Agathon*, *Aristippus*, *Socrates*, etc., are of that didactic and skeptical character which was beginning to mark the reflective genius of the continent, and which has since produced such immense changes in all departments of thought. Wieland was followed by a crowd of writers, in whose productions is more or less apparent the influence of the English novel-

ists, particularly Richardson and Fielding, who had been translated and carefully studied in Germany, where, however, the 'novel of manners,' whether serious or comic, dealt more largely in the representation of 'family life.' The principal names are August la Fontaine, Wetzel, Müller (whose *Siegfried von Lindenberg* is still remembered and read), Schulz, and Hippel. Almost contemporary with these quiet and somewhat prosaic novelists, there flourished for a brief period (1780–1800) a school of entirely opposite character, whose works, fiercely and outrageously romantic, had their poetic counterpart in Schiller's *Robbers*. They resemble, in their style of dealing with the feudal ages, the English romances of Mrs. Radcliffe and others, which probably suggested them. The chief writers of this 'turbulent school of fiction,' as it has been called, are Cramer, Spiers, Schlenkert, and Veit Weber.

Alone, and far above all others in redundancy and originality of fancy, humor, and pathos, towers Jean Paul Richter (q.v.), whose work disdains classification, and to whom, therefore, his countrymen have affixed the epithet of *Der Einzige* (The Unique). Apart from all schools—in this respect, but in this only, like Richter—stands Johann Wolfgang Goethe (q.v.), whose novels, as well as his poems, are poetico-philosophic efforts to represent, perhaps to solve, the great facts and deep problems of human life and destiny.

The reaction from the materialism and irreligious levity of French thought, showed itself in Germany toward the close of the 18th c., first in a certain earnest love and study of the old, simple, superstitious, and poetical beliefs of the middle ages. Hence originated the exquisite class of fictions called *Volksmährchen* (popular legends or tales), in which the Germans have never been equalled. The most illustrious cultivator of this species of fiction is Ludwig Tieck (q.v.), for Musæus (q.v.), though gifted with admirable powers of narration, is marked by a skeptical humor and irony, not altogether compatible with an imaginative conception of his subject. Other distinguished names are those of De la Motte Fouqué (q.v.), Chamisso (q.v.), Heinrich Steffens, Achim von Arnim (q.v.), Clemens Brentano (q.v.), Zschokke, and Hoffmann (q.v.). More recent novelists of note are Auerbach, Freytag, and Paul Heyse. The tales of Fritz Reuter, in the *Platt* or Low German, are original and delightful.

Novels and Romances of the 19th Century.—These have been produced in such overwhelming quantity, that volumes would be required merely to classify and characterize them. The vast and rapid increase in the material facilities of intercourse among European nations, during the last half of the 19th c., has, among other results, tended to diffuse through each country the literary products of all the others, especially those of an entertaining kind; and these have in turn more or less stimulated the imagination of native genius, so that at present there is hardly a people in Europe, not even excluding Turkey, which has not contributed something to the enormous

stock of fiction belonging to this period. It would be altogether out of the question to attempt here a notice, however brief, of the principal novels and romances of every European nation; we can only refer to the historical surveys of literature, under such titles as BELGIUM: BOHEMIA: HUNGARY: NETHERLANDS: NORWAY: POLAND: SWEDEN: TURKEY, etc., and to individual biographies of eminent continental novelists. Even in regard to England and France, we can do little more than catalogue a few prominent names—leaving novelists of the United States for some separate consideration.

1. *English Fiction.*—Almost the first novelist that we encounter in the 19th c., Sir Walter Scott (q.v.) is probably the greatest that England has ever seen, and certainly among the greatest of any country. Here, however, we have less to do with his personal rank in literature than with the kind of fiction that he cultivated. In a qualified sense, he may be regarded as a continuation of the romantic school; but it must be observed that he is free from all their monstrosities, spasms, tricks, and horrible machinery. Possessed at once of far greater antiquarian learning, imaginative genius, sound sense, and instinctive taste, than any of his 'romantic' predecessors, he knew precisely what to shun and what to choose; and though his Feudal Age, as depicted in *Ivanhoe, The Fair Maid of Perth*, etc, is a considerably idealized portrait of the rugged facts, it *is* a portrait, and not like Horace Walpole's and Mrs Radcliffe's performances, a wild caricature. The political reaction in Britain, after the sanguinary excesses of the French Revolution, assuming the form of a new and passionate attachment to venerable and time-honored traditions, showed itself in literature too, and Sir Walter Scott was its grandest representative. He strove to delineate the Past, as it seemed in the eyes of men who were dubious of the Present, and afraid of the Future—noble, stately, glittering, and gay, with the pulse of life ever beating to heroic measures. The overpowering genius of Scott necessarily but unhappily (for the comfort of readers) led to 'endless imitation,' but the only one of his followers that held for a time a tolerably decent position in literature is G. P. R. James (q.v.). Galt (q.v.) and Wilson (q.v.), the former with vulgar but racy humor, the latter with highly sentimental and overdone pathos, portrayed aspects of Scottish life which the author of *Waverley* passed over. Other novelists, such as Lockhart (q.v.), Miss Ferrier (q.v.), and Mrs. Johnstone, do not call for special notice; neither does Hope (q.v.), though his *Memoirs of Anastasius* is a most brilliant and powerful book; nor Moore (q.v.), though his *Epicurean* has all the sparkling and superficial splendors of his verse. After Scott, the next novelist who distinctly marks a new stage in the development of fiction is Sir Edward Bulwer Lytton (q.v.), in whose earlier works at least is seen something like a reflection of the cold, sneering, selfish, and sensual spirit that marked the higher classes during the period of the Regency; but the versatile genius of this author, and the different fields in which he

won renown, would make it quite unfair to define him as a merely 'fashionable' novelist, though his first and least meritorious distinctions were acquired in that capacity, and students of *Sartor Resartus* are apt so to remember him. Of fashionable novelists, strictly so called, the best known are Mrs. Gore (q.v.) and Theodore Hook (q.v.). This class was succeeded by another far worse than itself —the *Newgate novelists*, as they have been well termed, who sought for their heroes among highwaymen, thieves, desperadoes, and murderers, like Jack Sheppard, Blueskin, Dick Turpin, Claude Duval, etc., and, flagitiously indifferent alike to fact and morality, labored with pernicious success to invest the lives of these scoundrels with a halo of romantic interest and dignity. The chief of this school, 'by merit raised to that bad eminence,' is William Harrison Ainsworth (q.v.). During the last 40 years, novels have been multiplied to a degree almost alarming, and literally incalculable. The greatest names are unquestionably Dickens (q.v.), Thackeray (q.v.), and Miss Evans (q.v.); but besides these might be mentioned a host of others, who have attained either celebrity or popularity, or both. Every mode of life, and every kind of opinion, social, artistic, scientific, philosophical, and religious, has sought to recommend itself by adopting this fascinating garb. We have the nautical novels of Marryat (q.v.), redolent like Dibdin's songs, of the briny deep; the political novels of Disraeli (q.v.); the sporting and military novels of Lever (q.v.); the brilliant 'muscular Christian' novels of Kingsley (q.v.); the 'governess-novels,' as they have been aptly denominated, of Miss Brontë (q.v.); the 'school' novels of Hughes and Farrar; and the 'sensational' novels of Wilkie Collins, Miss Braddon, and others. Other authors not less eminent, but not so easily classified, are Mrs. Gaskell, Mrs. Norton, Miss Mulock (Mrs. Craik), Mrs. Oliphant (q.v.), Charles Reade (q.v.), Anthony Trollope (q.v.), George Macdonald (q.v.). Meredith, Whyte-Melville, M'Carthy, Blackmore, 'Ouida,' are well known; and William Black and Thomas Hardy have shown themselves artists of high class. (See most of the above titles.) The extraordinary increase of this potent and therefore perilous branch of literature cannot fail to excite reflection in thoughtful minds.

2. *French Fiction during the 19th Century.*—A few words are all that we can devote to this part of our subject, though it is far from uninteresting in either a literary or a moral view. The effect of the Revolution of 1789 on literature was not immediately beneficial, but the reverse, though it planted the germs of a multitude of new thoughts and aspirations in the mind of Christendom, which have since yielded, in France and elsewhere, a prolific harvest of wheat and—tares. The iron despotism of Napoleon crushed nearly all literary expression whatever. His hatred of 'idealogues' is well known, but the novel was that species of idealogic composition that came least into collision with the principles of imperialism. Even *it*, however, could hardly be said to flourish; and the only gifted writer of fiction who figures during the First Em

pire is Le Brun; and he was reduced to the necessity of caricaturing the *bourgeoisie*, to which Napoleon had no particular objection, as they were not his warmest admirers. Chateaubriand (q.v.) and Madame de Staël (q.v.) are insignificant in this department, and Charles Nodier, though voluminous, was not an original novelist. After the return of the Bourbons, especially after the revolution of 1830, France began to display a wonderful literary activity; and in particular, its long-repressed faculty of imagination burst into a sudden blossom of poetry and fiction. Even Napoleon, being dead, received a peculiar homage from the class to whom he had never shown favor or regard, of which the songs of Béranger and *Les Misérables* of Victor Hugo afford specimens. Unhappily for the purity of its literature, the *régime* of the Restoration, which followed the deliverance of France from a military despotism, was itself a base, corrupt, and profligate thing. The Bourbons came back only to re-enact the follies of their ancestors in the previous century, and the nation soon came to despise, detest, and disbelieve them, and the church which supported them. Hence, a certain reckless levity, and hollow mocking laughter, as of heartless skepticism, pervading those fictions which profess to delineate the realities of current life. Moreover, the sparkling wit, the sunny humor, the pathos, often exquisitely tender and refined, the delicate or deep delineation of character, the occasional fine flush of sentimental enthusiasm, and the poetic witchery of a religious mysticism, cannot blind us to the fact that the substance of most of the recent French fictions is incurably immoral. Paul de Kock (q.v.), Balzac (q.v.), Dumas (q.v.), father and son, Sue (q.v.), Dudevant (q.v.), Daudet (q.v.), Zola (q.v.), though wholly dissimilar in the quality of their genius, are in this respect too wofully alike. Victor Hugo (q.v.) and Lamartine (q.v.) are indeed morally far above the rest of their contemporaries, but they are perhaps the only great exceptions that can be mentioned. The 'Second Empire' did not improve the tone of the French novel, any more than it improved the tone of French society; but if it be true that when things have reached their worst they begin to mend, the country that has produced *La Dame aux Camelias* is perhaps, as regards the literature of fiction, in a hopeful condition. The Erckmann-Chatrian tales, graphic delineations of provincial life, are honorably distinguished by absence of indecency. Verne's tales of impossible semi-scientific voyages to the moon and elsewhere are unique. See Dunlop's *History of Fiction* (1814; new ed. 1882), Masson's *Sketch* (1859), and Wolff's *Allg. Gesch. des Romans*.

Novels and Romances in the United States.—In America, fiction may be said to have begun with the remarkable Indian stories and sea tales of James Fenimore Cooper. Here was in fact a starting-point for American fictitious literature, drawing no nourishment from that of any other people, nor any element whatever, except that of style, from any preceding writer. But though this

author and his works had a marked and wide effect on American literature, it never resulted in the production of another work of equal or even approximate excellence in the same direction. The character of American fiction began to veer in different directions, and the grotesque writings of Hoffman and Edgar A. Poe were seen strangely contrasted with the novels of Catherine M. Sedgwick, Maria J. McIntosh and Mrs. Ann S. Stephens. In fact, women have in America held a high position in fiction, and the *Uncle Tom's Cabin* of Mrs. Harriet Beecher Stowe was a veritable revelation in regard to the social condition which it depicted, while it was a whirlwind of power in the vast influence which it exercised on the generation in which it appeared. Mrs. Mowatt, Mrs. Southworth, and the author of *The Wide, Wide World* are additional names to illustrate the importance of woman in American fiction. But many admirable and popular authors in this branch of literature devoted themselves to short stories and sketches, a peculiar feature in American fiction, and gained well-deserved reputation. Such were Louisa May Alcott, Harriet Prescott Spofford, Elizabeth Stuart Phelps, and Helen Fiske (Hunt) Jackson ('H. H.'), in certain respects more influential than any other woman writer of her time. Her novel, *Ramona*, is a masterpiece of that class of fiction whose motive consists in the depicting of great national and social crimes.

In considering American fiction, it is to be particularly remembered that, more than that of any other country, it has been perforce in its specific qualities drawn from exotic sources. The ordinary society novel of the day has obtained its character chiefly from English writers, though in its lower strata it has depended on translations from the worst of the modern school of French novelists. The consequence has been that thoughtful writers have sought for a totally different line of authorship in which to exercise their abilities; therefore the 'short story' in its chief excellence as a work of art and a study of nature may be considered the most important indigenous product in American fiction. This is well recognized abroad, and the short stories of Bret Harte, Fitzjames O'Brien, Frank Stockton, John Habberton, and W. D. Howells have been characterized as the perfection of this class of writing. But the name of short-story writers is legion. Every magazine and newspaper in the country of any importance is flooded with offerings from this class of writers, many being of a high degree of excellence, and some achieving a reputation causing them to be remembered and mentioned during an entire generation. But by far the largest class of romances having success in the United States, has been those by such writers as Mrs. Ann S. Stephens, Mrs. Emma D. E. N. Southworth, Mary Virginia Terhune ('Marion Harland,') Mary D. Holmes, T. S. Arthur (mainly temperance stories), and Mrs. Caroline Lee Hentz. The most of these writers gave in their works reflections of recent British literature, the novels, for instance, of Mrs. Henry Wood, Miss Thackeray, Miss Braddon, and Rhoda

Broughton being the sources from which many of our women writers have drawn their inspirations, and in many cases their situations, scenic effects, characters, and style, or dialect, while their plots, though varied, were easily recognized as from English originals. In fact it may be said of American fiction in the mass that it has as yet exhibited, except in the direction of humor and in that of short stories, little specific individuality. There are however a few marked exceptions, of which Nathaniel Hawthorne is the type.

There is no school of American fiction, but there are and have been a number of able writers who have written works of marked interest and equal accuracy in their delineation of society, and whose writings have achieved notable popularity. Among such writers are W. D. Howells, Henry James, Francis Marion Crawford, Oliver Wendell Holmes, T. B. Aldrich, Theodore Winthrop, J. G. Holland, and E. P. Roe. These are here classed together only in reference to their popular success: they represent widely different methods, with the utmost variations in style, in intellectual grasp, in analysis of character, and in philosophical depth. To these should be added the names of Arthur Sherburne Hardy, author of the *Wind of Destiny;* Edward Bellamy with his *Looking Backward,* in its wide circulation and influence one of the most remarkable works of fiction with a purpose which this country has produced; 'Sidney Luska,' a promising young Hebrew writer; George W. Cable, an admirable delineator of Louisiana creole life; Lafcadio Hearne, with tropical wealth of descriptive power; T. W. Higginson; Miss Murfree ('Charles Egbert Craddock'); Edward Everett Hale; Edward Eggleston; Amelia E. Barr; Mrs. Burnett.

Unfortunately for American literature, the influence of that of modern France has developed a recent brood of young writers, men and women, whose efforts, while they have attracted wide attention and considerable circulation, have not always been in the direction of public morality or even that of good taste. Some of these have been ushered before the public through the pages of leading magazines. It is not necessary here to give the names of the writers whose works bear such distinctive marks. A number of young women who have derived the inspiration for their plots and characters, as above suggested, from foreign sources, and have produced ephemeral works of wide though probably transient circulation, have sprung up as a peculiar feature of the last few years in American literature. Some of the works of these budding 'authoresses' exhibit a depth and forwardness of social experience hardly to be expected even from writers of riper years, and these too accompanied with a frankness of expression unique in modern literary history.

American fiction, with many noble names, gives, in some recent instances that have gained prominence, a sense of powers misused. The thoughtful critic becomes aware of an influence which, if not deleterious, is at least not elevating, which affects writers as well as readers. There is

presented an *olla podrida* of fiction out of which it seems impossible to sort the original ingredients, and concerning which its seems equally impossible to conceive any sound reason for its existence. Forgetting one or two novel-writers whose pens move no more, one is tempted to think that though the country is honored by many good writers of fiction, the great American novelist—broad in range, strong in grasp, fine in touch, full of sympathy, yet poised in calm, true to human nature by being true to the high standards and ideals which belong to humanity as it divine birth-right—has yet to appear.

NOVEMBER, n. *nō-vĕm'bĕr* [L. *November*, ninth month of the old Roman year—from *novem*, nine: It. and F. *Novembre*]: eleventh month of the year; in *anc. Rome*, the ninth month, their year beginning with March, as it did in Britain till 1752. November had at first 30 days, then 29; later Julius Cæsar gave it 31; in the reign of Augustus the present number, 30, was given it. It was an important month in the the religious ritual of the Romans: Nov. 11 was held to mark the beginning of winter. In the Rom. Cath. ritual it retained prominence, having as principal festivals: All Saints' Day, Nov. 1; All Souls', Nov. 2; St. Martin's, Nov. 11; Presentation of the Virgin, Nov. 21; St. Cecilia's, Nov. 22; etc. In the Anglican calendar the only Nov. feasts retained are All Saints' and St. Andrew's. Nov. was known among the Saxons as *Blot-monath*, 'blood-month,' on account of the general slaughter of cattle at this time, for winter provision (known for a long time afterward as *Martinmas beef*) and for sacrifice—a custom not confined to the Saxons, but prevalent in n. Germany, and even as far s. as Spain. NOVEMBER METEORS, shooting-stars which are seen in their greatest numbers about Nov. 13,14.

NOVENARY, n. *nŏv'ĕn-ĕr-ĭ* [L. *novenārĭus*, consisting of nine—from *novem*, nine]: the number nine; nine collectively: ADJ. pertaining to the number nine.

NOVENAS, n. plu. *nō-vē'năz* [L. *novenī*, nine each, nine]: in the *R. Cath. Chh.*, nine consecutive days of prayer before any church festival.

NOVENNIAL, a. *nō-vĕn'nĭ-ăl* [L. *novem*, nine; *annus*, a year]: done or occurring every ninth year.

NOVERCAL, a. *nō-vĕr'kăl* [L. *noverca*, a stepmother]: pertaining to, or suitable to, a stepmother.

NOVGOROD, *nŏv-gō-rŏd'*: government of Great Russia, immediately s.e. of the govt. of St. Petersburg; extreme length s.w. to n.e. 400 m.; 47,240 sq. m. The surface is gently undulating, with the Valdai Hills in the s., which rise to about 300 ft., and may be said to form the watershed between the Baltic, Caspian, and White Seas. N. contains many lakes and rivers; of the former, lakes Ilmen and Bieloe are largest; of the latter, the Wolchof, Msta, Szeksna, and Mologa are most important. The rivers are connected by canals, which are of great service to trade. The soil, especially in the n.e., is not fertile, and the climate is severe; agriculture and cattle-rearing are carried

on, but not to a great extent. Forests and pasture lands are numerous and extensive, and the timber and hay sent to the capital realize considerable income. Quarries of the best stone for paving occur on the river Tosna, and near Stara-Russa are mineral and saline springs. Pop. 1,393,000.

NOVGOROD′: important town of European Russia, cap. of the govt. of N.; on the Volkhof, near where it issues from Lake Ilmen, 122 m. s.s.e. of St. Petersburg. It is the cradle of Russian history. In 862, the Norman prince Rurik, of the tribe of Variago Ross (whence the name *Russia*), was invited hither by the neighboring tribes, and from him begins the history of the country, and the line of its sovereigns. A monument, commemorative of this event was erected here, with great pomp, 1862 Sep. In the 9th c. Oleg, successor of Rurik, transferred the capital to Kief; but bestowed many privileges and liberties on N.; and from that time it began to prosper. The greatness of N. provoked the jealousy of the princes of Moscow, and 1471, the czar Ivan III. nearly destroyed the town, bereft it of its liberties, and exiled its leading citizens. During the time of its prosperity, the town was called Novgorod the Great; and had 400.000 inhabitants, and extended its sway to the White Sea and the river Petchora. Its govt. was a sort of republic, the prince being less a sovereign than the chief commander of the troops. Its greatness was due to its vast foreign trade alone; thence when Archangel was opened for English trading vessels, but especially after the foundation of St. Petersburg, its trade fell away, and the town rapidly declined. Of the existing ancient buildings, the most remarkable are the Church of St. Sophia, founded 11th c., possesing a fine old library, as well as some remarkable paintings and tombs; and the Krml, in the steeple of which hung the famous bell used to summon the citizens for the deliberation of state affairs. Pop. 26,100.

NOVGOROD′-SSJEWERSK′, *-syā-vĕrsk′*, or Novgorod-Severskoie, *-sā-vĕr-skō′yā:* town of Russia, province of Tchernigov, 89 m. n.e. from Tchernigov, on the right bank of the Desna, a branch of the Dnieper. It is cap. of a dist., and has considerable trade and activity. Pop. 9,200.

NOVGRAD-VOLYNSKI, *nŏv-grâd′vō-lĭn′skē:* town of European Russia, govt. of Volhynia, 52 m. w.n.w. from Jitomir: on the banks of the Slutch. It is cap. of a circle. Pop. 16,900.

NOVI, *nō′vē*, or No′vi Ligure, *lē-gô′rā:* town of n. Italy, province of Alessandria (Piedmont), at foot of the Apennines; a station on the railway from Turin to Genoa, 33 m. n.n.w. of Genoa. It carries on considerable transit-trade; and the silk produced in the vicinity is among the most celebrated in Italy. Novi witnessed the French defeat by Austrians and Russians, Aug. 15, 1799. Pop. 17,600.

NOVIBAZAR, *nō vē-bâ-zâr'*, also YENIBAZAR, *yĕn-ė-bâ-zâr'* (i.e., *New Market*): town of Bosnia, European Turkey; on the river Rashka, an affluent of the Morava, 130 m. s.e. of Bosna-Serai. N. has celebrated fairs, important trade, and considerable wealth, but the houses are mostly of mud. It is the chief town of a sanjak in the Turkish vilayet of Bosnia, occupied by Austria, 1879, according to the treaty of Berlin, under whose terms Austria does not administer the sanjak (the strip of land between Servia and Montenegro), but garrisons it, and controls the roads. N. has great strategic importance, commanding the communications between Bosnia and Rumelia, and between Servia and Montenegro. Pop. 9,000 to 12,000.

NOVICE, n. *nŏv'ĭs* [F. *novice*—from L. *novicĭus* or *novitĭŭs*, a fresh-man—from *novus*, new]: one new in any business or profession; a beginner; one in a convent or nunnery who has not taken the vow; a neophyte or tyro; a proselyte. NOVITIATE, n. *nō-vĭsh'ĭ-āt*, the state or time of being a novice; the time passed in a religious house, by way of trial, before the vow is taken; the time of preparatory training, which in all religious orders precedes the solemn PROFESSION (q.v.) For the general principles by which the training for the 'religious' life is regulated, see MONACHISM. The novitiate in all orders must continue (Conc. Trid. Sess. xxv. c. 85, *De Regul. and Mon.*) at least one year. In most orders it is of two years, and in several of three. Any attempt to solemnize the profession before the expiration of the novitiate, without a dispensation, is invalid. During the novitiate, the novices are immediately subject to a superior, called Master (or Mistress) of Novices. Their whole time is devoted to prayer, and to ascetic and liturgical training. During the novitiate, the novice continues free to withdraw; and the rule provides that he or she shall not be admitted to profession at the close of the novitiate, except after proof of fitness, and the proper dispositions for the particular institute aspired to. NOV'ICESHIP, the state of a novice.

NOVOARCHANGELSK' or NEW ARCHANGEL: see SITKA.

NOVO-GEORGIEVSK, *nō'vō-gā-ŏr-gė-ĕvsk'*, or MODLIN, *mod lĭn:* first-class fortress of Russia in Poland, at the junction of the Vistula and the Nareff, 19 m. n.w. of Warsaw. It forms the right flank of the line of defense of the Vistula against attacks from the w., the centre of the line being at Warsaw, and the left flank at Ivangorod 12,000 men are required to defend it. The fortifications afford shelter for about 50,000 men. The town Novoye Myesto, opposite the fortress, has about 5,500 inhabitants.

NOVOMOSKOVSK, *nō-vō-mŏs-kŏvsk':* important market-town of s. Russia, govt. of Ekaterinoslav, 20 m. n.n.e. of the town of Ekaterinoslav, on the Samara, an affluent of the Dnieper. Three extensive fairs, for sale chiefly of cattle and horses, are held here annually. The 'remounting' officers attend these fairs for the purpose of supplying their regiments with horses. Tanning and tallow melting are carried on. Pop. about 19,000.

NOVOTCHERKASK, *nō-vō-chĕr-kâsk':* town of s. Russia, cap. of the territory of the Cossacks of the Don, on the Aksaï, tributary of the Don, 12 m. from its right bank, about 70 m. e.n.e. of Taganrog. The central administration of the territory was transferred hither from Tcherkask 1804 by Count Platoff, commander-in-chief of the Cossacks. The choice was not fortunate, the town being too far from the Don, the great commercial artery. In 1855 a statue was erected in memory of Count Platoff, who achieved an illustrious name by his military exploits 1770-1816, especially during the French invasion 1812. The people are occupied in trade and manufactures, agriculture, cattle-breeding, fishing and wine-growing. Pop. 52,000.

NOVUM ORGANUM, *nō'vŭm awr'ga-nŭm:* the great work by Francis Bacon (q.v.), defined in its sub-title as the true pointings-out (*indicia*) concerning the interpretation of nature and the dominion of man (that is, over nature). The title has reference to the scholastic method in the Organon of Aristotle, and was intended to present a contrast with that method. The work was designed to be a portion of a more extensive one, embracing a reconstruction of science as well as of its processes. The marvel is that Bacon, in the midst of all the vain subtleties, and the false and fruitless knowledge spun from human brains, and relying on the baseless authority of such or such a one 'says' and at a time when hardly any solid science existed except astronomy—that he by a kind of infallible intuition conceived and set forth the Inductive Philosophy, the parent (in spirit at least) of modern progress in knowledge. That philosophy involves the observational and experimental method—the careful collection and scrutiny of facts, even to the extent, in his words, of putting nature to torture; and from these facts rigidly deriving laws, principles, and all generalizations. The motive in his view was 'fruit'—practical benefit to man, on which he continually insists; yet he did not overlook the purely intellectual benefit, for he says, 'Works themselves are of greater value as pledges of truth than as contributing to the comforts of life.' The first part of the *Organum* would clear the way by considering the obstacles to progress—the several kinds of errors and fallacies (*idola*), such as those incident to humanity, to the individual, to the misleading by words, to erroneous systems of philosophy and methods of demonstration. The rest of the work goes on to discuss the properties of things and the method to be pursued; and this in some of its elaborate details is open to adverse criticism. Bacon insisted especially on the elimination of the non-essential, in scientific inquiries. He says, 'The induction which is to be available for the discovery and demonstration of sciences and arts must analyze nature by proper rejections and exclusions; and then, after a sufficient number of negatives, come to a conclusion on the affirmative instances.' His method is illustrated by him in the *Organum*, by an investigation into the nature of heat. It has been

remarked that the service rendered by Bacon is chiefly in showing the necessity of a critical analysis of experience, but that the progress of science has not been by the exact steps that he recommended—rather in the main by hypothesis, which, while presupposing critical induction, experimentation, verification, is due largely to a scientific imagination.

NOVUS HOMO, n. *nō'vŭs hō'mō*, plu. NOVI HOMINES, *nō'vī hŏm'ĭ-nēz* [L.]: in Roman antiquity, a man who was the first of his family who had raised himself from obscurity to distinction, without the aid of family connections.

NOW, ad. *now* [AS. *nu;* Dut. *nu;* Icel. *nú;* Gr. *nun,* L. *nunc*, now]: at the present time; very lately; a little while ago; after this; since things are so: N. the present time or moment. NOWADAYS, ad. *now'ă-dāz* [said to be corrup. from *now on days*]: in this age. NOW AND THEN, occasionally.

NOWANAGAR, *nō-wân-nŭg-gėr'*, or NAWANUGGUR: seaport of India, in the peninsula of Kattywar, Guzerat, at the mouth of the Nagna, a small river on the s. shore of the Gulf of Cutch, 160 m. w.s.w. from Ahmedabad, n. lat. 22° 28′, e. long. 70° 11′. It is the principal place of the dist. of Hallar, the greater part of which is held as a *jaghire* by the chief of N., who bears the title Jam of Nowanagar. His territory comprises 540 villages, pop. about 290,000. The town of N. is large and populous, nearly four m. in circuit. It has very active trade, and is famous for the fine cloth which it produces, and for the brilliant colors with which its fabrics are dyed. In the adjacent sea are beds of pearl-oysters. Copper ore has been discovered in a range of hills behind the town.

NOWAY, ad. *nō'wā*, or NO'WAYS, ad. *-wāz* [*no*, and *way*]: in no manner or degree.

NOWEL, n. *nō'ĕl* [F. *noyau;* OF. *noial*, a fruit-stone, a kernel, the spindle of a staircase—from mid. L. *nucālis*—from L. *nux*, a nut]: the core or inner part of a loam-mold used in casting large cylinders or a piece of ordnance, anything contained in a hollow envelope.

NOWELL, *nō'ĕl*, INCREASE: colonist: 1590–1655, Nov. 1. b. England. He came to this country with John Winthrop in the *Arabella* 1630; was made ruling elder of the church in Boston, Aug. of that year, but soon resigned, because he disapproved of the union of church and state in his office; was dismissed from his Boston pastorate, and established a church in Charlestown; was military commissioner 1634, and sec. of the Mass. colony 1644–49. He was an active member of an association to abolish long hair as a mark of 'dignity and estate.' He died in poverty at Boston, and the colony acknowledged his services by granting his widow 1,000 acres of land in Cocheco co., N. H.

NOWHERE, ad. *nō'hwār* [*no*, and *where*]: not in any place.

NOWISE, ad. *nō'wīz* [*no*, and *wise*] not in any manner or degree.

NOWT, or NOUT, n. *nowt* [Icel. *naut;* Sw. *noet*, an ox: Scot. *nolt;* Gael. *nith*, cattle]: in *Scot.*, black cattle; an ox; a stupid fellow; in English the phrase is *neat* cattle: see NEAT 2.

NOX: goddess of night, one of most ancient deities of classical mythology; daughter of Chaos and sister of Erebus (Darkness), by whom she was mother of Æther (the air) and Hemera (Day); mother also of the Parcæ, Hesperides, Dreams, Discord, Death, Momus, Fraud, etc. In the Temple of Diana at Ephesus, was a famous statue of her by Rhœcus. The ancients worshipped her with great solemnity, and Homer represents Zeus as fearing her. A black sheep was offered her as mother of the furies, and a cock because it proclaims the approach of day. She is represented mounted on a chariot, wearing a veil spangled with stars, and preceded by the constellations as special messengers. Sometimes she is holding two children, one black, representing death or night, the other white, sleep or day. She is described also as a woman veiled in mourning, crowned with poppies, her chariot drawn by owls and bats.

NOXIOUS, a. *nŏk'shŭs* [L. *noxĭus*, hurtful—from *nŏcĕō*, I hurt]: productive of injury or of evil consequences; unwholesome; baneful; poisonous. NOXIOUSLY, ad. *nŏk'-shŭs-lĭ.* NOX'IOUSNESS, n. *-nĕs*, the quality that injures or destroys.—SYN. of 'noxious': hurtful; prejudicial; detrimental; pernicious; deleterious; injurious; noisome; harmful; destructive; mischievous; corrupting; insalubrious.

NOY, v. *noy:* OE. for *annoy.* NOYANCE, n. *noy'ăns*, OE. for *annoyance.* NOYOUS, a. *noy'ŭs*, in *OE.*, causing annoyance.

NOYADES, *nwâ-yâd'* [i.e., 'Drownings,' from F. *noyer*, to drown]: execution of the death sentence on political offenders in great numbers at once by drowning them; one of the atrocities of the French Revolution, practiced at Nantes by Carrier, deputy of the Convention: see CARRIER. This mode of execution was called in cruel sport, *Vertical Deportation.*

NOYAU, n. *nwī-yō'* [F. *noyau;* OF. *noial*, stone of a fruit—from mid. L. *nucālis*, an almond—from L. *nux*, a nut]: a cordial flavored with bitter almonds or the kernels of peach-stones: see LIQUEUR.

NOYES, *noyss*, EDWARD FOLLANSBEE: b. 1832, Oct. 3, Haverhill, Mass.: He graduated at Dartmouth 1857, and at the law school, Cincinnati, O., 1858; practiced law in Cincinnati until the outbreak of the civil war, when he entered the Federal army, serving as maj., lieut.col., and col. of the 39th O. inf. until 1864, July, when the loss of a leg unfitted him for field duty. He was then assigned to the command of Camp Dennison, and became brig.gen. by brevet. He resigned 1865, Apr. He was afterward city solicitor of Cincinnati, gov. of O. 1871, and in 1877 was appointed U. S. minister to France, and sent on special mission to the Mediterranean countries. He resigned 1881, and resumed law practice; d. 1890, Sep. 4.

NOYES, George Rapall, D.D.: 1798, Mar. 6—1868, June 3; b. Newburyport, Mass. He graduated at Harvard Univ. 1818; studied divinity, and was licensed to preach 1822. He was engaged as tutor 1823-27, and in the latter year settled over a Unit. Church in Brookfield, Mass., removing the same year to Petersham. He was considered one of the best Hebrew and Greek scholars in America. He received the degree D.D. from Harvard 1839. He was prof. of oriental languages and lecturer on Biblical literature at Harvard from 1840 till his death. He translated the Old and New Testaments.

NOYES, John Humphrey. See Perfectionists.

NOYES, William Curtis, D.D.: 1805, Aug. 19—1864, Dec. 25; b. Schodack, Rensselaer co., N. Y. He was admitted to the bar 1827, became dist.atty. of Oneida co., and 1838 removed to New York. In 1857 he was appointed one of the commissioners to codify the state laws, on which work he was engaged until his death. He received the degree LL.D. from Hamilton Coll. 1856. He was learned, eloquent, and logical, and deeply interested in public affairs, though not a politician. In 1857 he was nominated by the repub. party as atty.gen., but was defeated, and in 1861 was a prominent candidate for the U. S. senate. He was appointed a member of the peace commission of 1861. He was a warm advocate of temperance.

NOYON, *nwâ-yōng':* town of France, dept. of Oise, 78 m. n.n.e. of Paris by the northern railway. It has a fine cathedral ('Notre Dame'), of the 12th and 13th c., in the Romanesque style with mixture of Gothic; an episcopal palace, and some linen and cotton manufacturers. N. was a residence of Charlemagne, and here Hugo Capet was crowned King of France 987. It was also the birthplace of John Calvin. Pop. 7,450.

NOZZLE, n. *nŏz'l* [Low. Ger. *nüssel*, the nose: merely a diminutive of nose with the suffix *le* (see Nose)]: the nose; the snout; the projecting part, as the air-pipe of a bellows, or the part of a lamp that holds the wick.

NUANCE, n. *nû'ăngs* [F. *nuance*, a shade—from *nuancer*, to shade]: a shadowing; a shading; a blending of colors.

NUBAR PASHA: Egyptian statesman: b. Smyrna, 1825; d. Paris, 1899, Jan. 14. He became Egyptian minister at Vienna 1854; was intrusted with negotiations for the Suez canal 1857-60, and appointed minister of foreign affairs 1866. In 1867 he negotiated the treaty with Constantinople giving Egypt practical autonomy and Ismail the title of Khedive, and in 1868-74 the judicial reform establishing international tribunals. He was dismissed from office 1874 and 78. In the latter year he assisted to form the Anglo-French ministry. He was recalled to office and formed a ministry, 1884, Jan.; and was dismissed by the Khedive, 1888, June. He was again premier 1894-5.

NUBECULA, n. *nū-běk'ū-lă* [L. *nubēc'ŭla*, a little cloud —from *nubēs*, a cloud]: in *astron.*, the Magellanic clouds, two extensive nebulous patches of stars.

NUBIA, *nū'bĭ-a:* comparatively modern name for a large region of Africa, formerly a portion of Ethiopia (q.v.), and extending on both sides of the Nile from Egypt on the n. to Abyssinia, Senaar, and Kordofan on the s.; touching the Red Sea on the e. and the desert on the west. It thus comprises the Nile valley from Assouan (Syene) to Khartûm, about 560 m. n. and s., 16°—24° n. lat.; and nearly as far e. and w., 31°—39° e. long. *Nubia Proper*, or *Lower Nubia*, extends from Assouan on the Egyptian frontier to Dongola; beyond that is *Upper Nubia*. But of late the name *Egyptian Sudan*, properly applicable to a section of Upper N., has come to be used for N. in its widest sense, together with the formerly Egyptian territory actually in the Sudan, and the equatorial provinces (see SUDAN: NILE). N. is not an administrative division: politically and ethnically it is indefinite; it has, however, a geographical significance, and thus considered it has about 345,000 sq. m.; pop. vaguely estimated 1,000,000 to 1,500,000.

The name is by some derived from the Coptic *Noub*, or Gold; by others from the *Nobatæ* tribe, afterward *Nubas*, with whom it was first historically associated—a name appearing also in *Wady Nuba*, the northernmost section of Lower N., the southern being Wady Kunuz (or Kenous). Under the Pharaohs, N. was called Cush, and was governed by a royal scribe, entitled Prince of Cush or Ethiopia, till the 20th dynasty, when it appears to have been recovered by a series of native rulers, who ultimately conquered part of Egypt. These Ethiopians adopted the civilization of the Egyptians, and were Christianized: see ETHIOPIA. At present the country is occupied by races belonging to several different stocks, which have in most places become much mixed in blood. The chief elements are Arab, mingled with Nilotic and Negro blood, mainly in Upper N.; Ababdeh and Bisharin between the Nile and the Red Sea.; and Nubas and Barabira in Lower N., on and near the Nile between Assouan and Dongola. The Semitic Arabs are comparatively recent intruders. They entered N. after occupying Egypt in the 7th c.; but were resisted by the Christian Dongolawi kings till the 14th c., when the Arabs, assisted by a large contingent of Bosnians, became masters of the land. The Nobatæ brought hither by Diocletian, were apparently a negro race. Their modern representatives are the Negro or Negroid Nubas, calling themselves Berbers, Barabras, or Barabira. The ancient Blemmyes were of Hamitic stock, and ethnologically akin to the ancient Egyptians. The Bisharin or Beja are their descendants; and the Ababdeh likewise are Hamitic. The Nuba speech is fundamentally negro in type, akin to the Nubic of Kordofan; and is spoken in three main dialects. Presumably, the aboriginal negro population and tongue have been gradually modified by the admixture of Hamitic and Semitic elements. The va-

rious tribes, most of them active and warlike, are Moslems by faith, and till 1820 were ruled by their own chiefs. In that year, Ismail Pasha made N. an Egyptian territory; and till 1881 it shared the fortunes of Egypt. For its later history, see EGYPT: SUDAN. Both in its lower and in its upper sections, N. is mostly an expanse of steppes or rocky desert, with patches where grass sometimes grows, and ravines in which moisture enough is found to keep alive a few mimosas or palms, and to raise pasture for gazelles and camels. There are also wells and small oases here and there as on the chief caravan routes. The great 'Nubian Desert' lies e. of the Nile, opposite the great w. bend of the river. Below (i.e., north of) Khartûm, rain is almost unknown; the climate is accordingly excessively hot and dry, and except in the river ports after the fall of the Nile leaving numerous stagnant pools, is healthful. The only exception to the general aridity is the narrow strip of country on both sides of the Nile, nowhere exceeding four m. in breadth, and in many places only a quarter of a mile wide. The most fertile part is near Dongola. A mountain barrier bounds the valley on both sides of the Nile, and consists of granite and sandstone. The soil raises durra, cotton, and date palms. The country is traversed by the *Bahr el Azrek*, or Blue Nile, and the *Bahr el Abiad*, or White Nile. The products are numerous, comprising maize, dates, tamarinds, gums, aloes, civet, musk, wax, myrrh, frankincense, senna, black wool, hides both of the elephant and rhinoceros, and their ivory, ostrich feathers, ebony, gold dust, saltpetre, salt, tobacco, coffee, cotton, which are carried in commerce to Egypt. The taxes are rated by the number of water-wheels for the irrigation of the land. There being no native currency, the coins of Egypt and Europe, especially the Spanish dollar, are received, but glass-beads, coral, cloth, *tobs* or shirts, and cloth (*samoor*) also pass as money. In Kordofan, value is reckoned by cows. The most primitive modes of measurement are in use, maize being sold by the handful (*selga*), 18 of which go to a *moud;* and cloth being measured from the elbow to the fingers. Polygamy is general, and a wife at Kenous is purchased of her parents for 30 piastres (about $1.50); among the Arabs for 6 camels, 3 of which are returned to the bridegroom. Some of the tribes are jealous of their women, who are celebrated by travellers for their virtue. In their costume, they use turbans, linen, and woolen garments; and they are armed with lance and shield, the latter made of the hide of the hippopotamus. They have no looms, but they plait neatly. Their chief musical instrument is a guitar of five strings, with sounding-board of a gazelle's hide. They are generally averse to commerce, eat little animal food, and are Mohammedans. Their houses are low huts of mud or stone. The chief attraction of this country to travellers is the numerous temples and other ancient remains of the Egyptians, extending from Philae to the Island of Argo. These consist of the temple of Isis, in the isle of Philae, founded by Nectanebo I., and con-

tinued by the Ptolemies; the temple of Deboud, built in honor of Amen Ra, by Ataramen, and continued by the Romans; Tafa or Taphis, modern Kalabshe, built by Rameses II.; the rock temple of Beit e Welly, recording the conquests of the same monarch; Wady Halfa, built by Osertesen I.; the rock temple of Ibsamboul, built by Rameses II.; Gebel Addeh, built by Horus of the 18th dynasty; Ibrim, built by Amenophes II.; Amada, founded by Thothmes III.; Ghersheh, Sebona, and Derri, built by Rameses II.; Dakkeh, anc. Pselcis, built by Ergamenes; and the Colossus of the Isle of Argo; the Pyramids of Meroë and Tanquassi.—Burckhardt, *Travels:* Champollion le Jeune, *Lettres Ecrites,* 107, and foll.; Lepsius, *Reise,* 107, and foll.

NUCAMENT, n. *nū'kă-mĕnt* [L. *nucamen'tum,* a long excrescence hanging from the pine—from *nux,* a nut]: in *bot.,* a catkin or cat's-tail—the blossom of the hazel-pine, willow, etc. NU'CAMENTA'CEOUS, a. *-tā'shŭs,* pert. to nuts.

NUCIFEROUS, a. *nū-sĭf'ĕr-ŭs* [L. *nux,* a nut, *nūcis,* of a nut; *fero,* I bear]: bearing or producing nuts.

NUCLEAR, NUCLEATED: see under NUCLEUS.

NUCLEOBRANCHIATA, *nū'klē-ō-brăng'kĭ-ā'ta,* or HETEROPODA, *hĕt-ĕr-ŏp'o-da:* order of gasteropods having the sexes distinct; the locomotive organ fin-like, single, and ventral; the gills packed in small compass with the heart. They all are marine, and swim usually with the back downward, and the fin-shaped foot upward. They adhere to sea-weeds by a small sucker on the fin. Some of them, e.g. *Atlanta,* have a shell large enough to protect the body; some, e.g. *Carinaria,* have a small shell covering the gills and heart only; and some, e.g. *Firoïa,* have no shell at all.

NUCLEOLITES, n. plu. *nū-klē'ō-līts* [L. *nucleus,* a little nut or kernel; Gr. *lithos,* a stone]: a genus of fossil sea-urchins characterized by their long inflated shell, rounded in front and flat behind.

NUCLEUS, n. *nū'klē-ŭs* [L. *nucleŭs,* a small nut, a kernel—from *nux,* a nut: It. *nucleo*]: anything round which matter has accumulated; that which may form the solid basis, as the *nucleus* of an army; that which may form the centre of development (see CELL-THEORY): the solid center of any nodule or rounded mass; the central fleshy part of an ovule; the body of a comet: plu. NU'CLEI, *-ī* NU'CLEAR, a. *-ĕr,* pertaining to or connected with a nucleus. NU'CLEATED, a. *-ā tĕd,* having a nucleus or central part. NUCLEOLUS, n. *nū-klē'ō-lŭs,* a small nucleus; a very minute body contained within a nucleus.

NUCULA, n. *nū'kū-lă* [L. *nucula,* a small nut—from *nux,* a nut]: in *bot.,* a hard pericarp of horny or bony texture; an extensive genus of bivalves characterized by their trigonal inflated shells; also spelled NUCULE, n. *nū'kūl,* in its *bot.* signification. NUCULANIUM n. *nū'kū-lā'nĭ-ŭm,* in *bot.,* a two or more celled indehiscent fruit, formed from a superior ovule filled with fleshy pulp, and containing seeds, as in the grape.

NUDE, a. *nūd* [L. *nudus*, naked: It. *nudo:* F. *nu*]: bare; naked: N. among *artists*, the undraped human body. NUDE'LY, ad. *-lĭ*. NUDITY, n. *nū'dĭ-tĭ* [F. *nudité*]: nakedness.

NUDGE, v. *nŭj* [Low. Ger. *nutschen*, to squeeze: Austrian, *nussen*, to thrust with the fist: Scot. *gnidge*, to squeeze: Icel. *knyja;* Dan. *knuge*, to press]: to touch gently with the elbow or knuckles, as a signal for attention or information: N. a gentle push with the elbow for information, etc. NUDG'ING, imp. NUDGED, pp. *nŭjd*.

NUDIBRANCHIATE, a. *nū'dĭ-brăng'kĭ-āt* [L. *nudus*, naked; Gr. *brangchia*, gills]: pertaining to the order of molluscous animals having no shells whatever, and having naked gills. NU'DIBRAN'CHIA'TA, n. plu. *-kĭ-ā'tă*, order of molluscous animals—gasteropods, hermaphrodite, destitute of shell, and having the gills exposed on the surface of the body. The gills are differently situated in different genera. The genus *Doris* (q.v.) is an example of this order.

NUECES, *nwā'sēz*, Sp. *nwā'sās*, RIVER: stream in s.w. Texas, rising lat. 30°, long. 101° w. It flows s.e. 300 m. into Corpus Christi Bay, and through the Pass of Corpus Christi into the Gulf of Mexico.

NUEL, and NEWEL, n. *nū'ĕl:* see under NOWEL.

NUE'VA SPAR'TA: see MARGARITA.

NUEVO LEON, *nwā'vo lā-ōn':* interior Mexican state, bounded n. by Rio Grande, e. by Tamaulipas, s. by San Luis Potosi and Zacatecas, w. by Coahuila; 23,635 sq. m. The surface is irregular, being traversed by the Sierra Madre system; the s. portion is part of the great central tableland of Mexico. There are no navigable rivers, though numerous branches of the Rio Grande intersect the extensive valleys, which consist of forests, pasture lands, and cultivated fields; these streams have steep courses, while mountain torrents and small lakes are numerous. The soil is generally fertile, but needs irrigation. The chief products are sugar cane and maize, three crops of the latter being harvested annually; a little wheat and barley are raised. Minerals include gold, silver, copper, iron, cinnabar, and lead; salt is abundant, but little worked; nitrate of potash, sulphur, and several varieties of sulphate of lime, alabaster, and marble are found. The development of mines is limited. In the vicinty of Morelos and Monterey, sulphur and hot springs are common. The climate is hot and unhealthful in the lowlands, where intermittent and malignant fevers prevail, but more temperate in the higher regions. Steam-power is employed to some extent in the large manufactories of cotton goods, hats, furniture, boots and shoes. Considerable attention is given to education. The nine districts of Nueva Leon are Monterey, Villaldama, Doctor Arroyo, Cadereita, Victoria, Salinas, Linares, Morelos, Gracia, and Cerralvo. Monterev is the cap.; other important towns are Morelos, Saltillo, Linares and Cadereita. Pop. of state (1900) 326,940.

NUGATORY, a. *nū'gă-tër-ĭ* [L. *nugatōrĭŭs*, trifling, worthless—from *nugæ*, trifles: It. *nugatorio*]: useless; trifling; futile; ineffectual; of no force.

NUGGET, n. *nŭg'gĕt* [prov. Eng. *nug*, a block; *nugget*, a little block: OE. *niggot*, a lump of gold or silver—supposed to be the corruption of *an ingot*]: the name given by gold-diggers to those irregular pieces of the precious metal found in auriferous soil, of all sizes, from that of a pea to lumps many pounds in weight.

NUGGINA, or NUGEENAH, or NAGINA, *nŭg-ē'na:* town of Brit. India, dist. of Bijnur, division of Rohilcund, N.W. Provinces; 48 m. n.n.w. from Moradabad, on the route from Moradabad to Hurdwar. N. is the Birmingham of Upper India, and famous in modern times for manufacture of gun-barrels and percussion-locks. Pop. 22,200.

NUISANCE, n. *nū'săns* [OF. *nuisance*, damage, wrong: It. *nocenza*, fault, error: F. *nuissant*, hurting: L. *nocerĕ*, to hurt (see NOISOME)]: anything offensive or injurious; something that produces inconvenience or damage; annoyance.—Nuisance, in *law*, denotes whatever is an annoyance to one's neighbors, or in a general sense to the public at large, in the exercise of their rights of property. The whole doctrine of N. is founded on the theory that every person is entitled to have the full use and enjoyment of his property, and of the right of passing to and fro on the highway without being interfered with or impeded by others, and whatever so impedes this full enjoyment of one's property and right of passage on the highway is a N. Nuisances are thus capable of being divided into two kinds—private and public. Thus, if a neighbor leave a heap of rubbish emitting noxious smells close to A's windows, or make loud unseemly noises in his own house, these may be said to be private nuisances, for they annoy A in the enjoyment of the fresh air and quiet which are part of his right of property. On the other hand, if something is put of the same kind on a public highway, or so as to annoy divers people equally and in the same manner, then it is called a public N. One of the leading incidents of a N. is, that the party annoyed by it can in many cases, especially where the N. is injurious to health or life, take the law into his own hands and abate the N. without resorting to a court of law. The reason is, that the matter is of too urgent importance to await the slow progress of a suit at law, and mischief may be done in the meantime which would often be irreparable owing to the delay. Another important qualification of the right of abating a N. is, that the N. must be such that unless it is abated at once the party cannot exercise his legal rights; and hence if the N. is of such a kind that it does not directly interfere with the comfort or enjoyment of one's legal rights at the time, he has no right to abate it, but in that case is bound to resort to a court of law. This is best illustrated in the case of a N. on the highway, which is the class of cases in which the phrase a common N. is most familiarly known. Thus, if while A is riding or driving along the highway his progress is interrupted by a fence or gate

which nobody has a legal right to put there, it is obvious that unless A can knock down or demolish at once this obstruction, he cannot proceed in the exercise of his legal right of using the highway. In such a case he has a right to demolish the gate and abate the N., for it directly interferes with his own legal right. But if instead, a gate, a booth. or tent had been erected, not across the highway, but merely on one side of it, so as to leave room for passengers to pass, then though such tent or booth would be as undoubted a N. as in the other case, yet inasmuch as A can pass without direct interference, he has no right to abate the N. by destroying the tent. He must, in this latter case, resort to the legal remedy only. The same rule applies to all kinds of nuisances.

Another rule is, that in abating a N. the party is not to do unnecessary damage to property, i.e., more than simply abate the N. to such an extent as to enable himself to exercise his legal right, and no further. If he go beyond the immediate occasion, and cause unnecessary destruction to property, then he subjects himself to an action of damages. Hence it is often difficult to know when one is justified in abating a N. and taking the law into his own hands.

Where the N. is sought to be removed by legal means, then the remedy is in some cases twofold, and in some cases not so. Where the N. is of a private nature, an action of damages is in general the only remedy given by the common law. But where the N. is public, and affects all the public equally, or nearly so, then in general either an action may be brought, or an indictment will lie. Thus in case of a N. on a highway, as this affects all the citizens alike, an indictment is the proper remedy, though if an individual suffer special damage over and above what he suffers as one of the public, then he may bring an action.

The legal remedy in cases of N. has long been felt to be insufficient. To add to the other defects, there is great difficulty in determining whether a particular mode of using one's premises is in the nature of a N. or not; for if the line is drawn too narrowly, the rights of property and the natural freedom of the citizen may be interfered with. On the other hand, things which formerly were considered no nuisances are now treated as such, owing to the general increase of enlightenment, refinement, and sensitiveness. The common law has been altered by acts establishing municipal or other local boards having in charge sanitary improvements, such as drainage and water supply on a large scale. These boards exercise extensive powers for correction or removal of whatever is shown to be a N., or injurious to health, either by its own nature, or through abuse or neglect, or improper management. Within their purview as nuisances are filthy cesspools or drains, deposits or accumulations of offensive or decaying matter, overcrowded tenements, animals kept in injurious proximity to dwellings, manufacturing processes needlessly producing unhealthful effluvia, etc. It is to be noted, however, that a thing may be a N. in one place, or at one time, and not so

in another: circumstances must be considered, sometimes also the previous history of the case.

Beside the above usual legal acceptation of the term N., the word is sometimes familiarly applied to disorderly houses or brothels, described as common nuisances.

NUKHA, or NUCHA, or NOUKHA, *nô-ċhâ':* town of Russia; after Tiflis and Shemacha, the most important in Transcaucasia, and only town of the former khanat of N. or Sheki, in n.w. Shirwan. It is 173 m. e.s.e. from Tiflis; at the s. base of the Caucasus in the valley of the Kish-Tshai, affluent of the Alasan, which itself is a branch of the Kur. N. has about 3,000 houses, mostly of mud and thatched with reeds; it has a great fortress-palace (built 1765), four churches, and 31 mosques. The town is surrounded for several miles by mulberry groves and fruit-gardens. It has long been famous for the rearing of silk-worms, silk-spinning, and silk manufacture. Pop. about 25,000, and 21 villages in its dist. of 1,442 sq. m. contain about as many more people.

NULL, a. *nŭl* [F. *nul*—from L. *nullus*, none: It. *nullo*]: of no legal or binding force; void; invalid: V. in *OE.*, to annul. NULLITY, n. *nŭl'lĭ-ti*, want of existence or force; want of legal force or validity.

NUL'LA BO'NA: legal phrase, descriptive of the return made to a sheriff who in executing process against a debtor finds that he has no goods.

NULLAH, n. *nŭl'lâ* [Pers. *nāla*, a small river]: in the *E. Indies*, a term applied to streams, water-courses, or canals.

NULLIFICATION OF UNITED STATES LAWS: in American politics, the doctrine of the extreme states' rights party, of the right of a state to declare a law of congress unconstitutional and void, even though it had been formally approved by the pres. and declared constitutional by the U. S. supreme court; and if the Federal govt. attempted to enforce it, the further right to secede from the Union. The germ of this remarkable political speculation is traceable in the Ky. and Va. resolutions of 1798–9, drawn up by Jefferson, regarding the alien and sedition laws —in which the assertion is made that the general govt. is not 'the final or exclusive judge of the extent of the powers delegated to itself, but that . . . each party has an equal right to judge for itself, as well of infractions as of the mode and measure of redress.' In congress Senator Hayne of S. Car. advocated this speculation, and called forth Webster's historic reply 1830. In 1832, during the presidency of Gen. Jackson (q.v.), the free trade and states' rights party in S. Car. (q.v.), under the astute leadership of John C. Calhoun (q.v.), her senator in congress, asserted the doctrine of N. in a state convention at Charleston which declared the tariff acts by congress of that year unconstitutional, therefore null and void; that the duties should not be paid; and that any attempt on the part of the general govt. to enforce their payment would cause the withdrawal of S. Car. from the Union, and the establishment of an independent government. Pres. Jackson

met this declaration with a vigorous proclamation, in which he declared that the laws must be executed, and that 'the Union must and shall be preserved.' South Car. finding herself standing alone, receded from her position under protest, and a 'Compromise Bill,' introduced by Henry Clay (q.v.) 1833, providing for a gradual reduction of duties, quieted for the time the controversy, renewed and settled a generation later in the war of secession.

NULLIFY, v. *nŭl'lĭ-fī* [L. *nullus*, none; *fīo*, I am made]: to deprive of legal force or efficacy; to render void or invalid. NUL'LIFYING, imp. NUL'LIFIED, pp. *-fīd.* NUL'LIFIER, n. *-ĕr*, one who makes void. NULLIFICATION, n. *nŭl'lĭ-fĭ-kā'shŭn* [L. *faciō*, I make]: the act of nullifying; the rendering void and of no effect (see NULLIFICATION OF U. S. LAWS).—SYN. of 'nullify': to annul; repeal abolish; abrogate; revoke; void.

NULLIPORES, n. plu. *nŭl'lĭ-pōrz* [L. *nullus*, none, *porus*, a pore]: a sort of marine plants resembling corals in so far as they secrete lime on their surfaces, but having no pores like corals—hence the name.

NUMANTIA, *nū-măn'shĭ-a:* chief town of the Celtiberian people called Arevaci in anc. Spain; on the Douro (Durius), in the neighborhood of the present Soria in Old Castile. The site is probably marked by the present Puente de Guarray. N. is famed for its heroic resistance to the Romans, from B.C. 153, when its citizens first met a Roman army in battle, to B.C. 134, when it was taken and destroyed by Scipio the younger, after a siege of 15 months, in the course of which famine and the sword had left alive very few of its 8,000 brave defenders. The besieging force under Scipio amounted to 60,000 men.

NUMA POMPILIUS, *nū'ma pŏm-pĭl'ĭ-ŭs*, in the Mythic History of Rome: second of the kings of Rome, being successor of Romulus, the founder of the city. He was a native of Cures in the Sabine country, and was reverenced for wisdom and piety. Unanimously elected king by the Roman people, he soon justified their choice by his conduct. After dividing the lands which Romulus had conquered, he proceeded, with the assistance of the sacred nymph Egeria, to draw up religious institutions for his subjects, and thus stands out in the primitive legend as the author of the Roman ceremonial law. His reign of 43 years was a golden age of peace and happiness. The only feature in the myth of N. P. which is probably historical, is that which indicates the infusion of a Sabine religious element into Roman history at some early period.

NUMB, a. *nŭm* [Goth. and AS. *niman;* Icel. *nema*, to take away: Icel. *numinn*, taken away. NUMB was formerly and correctly spelled NUM]: destitute of the power of sensation and motion; torpid; chill: V. to deprive of the power of sensation or motion; to chill; to stupefy; to deaden. NUMB'ING, imp.: ADJ. causing numbness; rendering torpid. NUMBED, pp. *nŭmd:* ADJ. rendered torpid. NUMBNESS, n. *nŭm'nĕs*, state of being numb; torpor; deadness; stupefaction.—SYN. of 'numb, a.': paralyzed: benumbed: motionless: stupefied.

NUMBER, n. *nŭm'bėr* [F. *nombre*—from L. *numĕrus*, a number]: one, or more than one; many; a multitude; a collection of units or things of the same kind; in *gram.*, the variations in the endings of words, as of nouns and verbs, to express sing. or plu.: division of a work published in parts; in the plu. *numbers*, poetic measure or verse: V. to reckon as one of a collection or multitude; to count; to calculate. NUM'BERING, imp. NUM'BERED, pp. *-bėrd*. NUM'BERER, n. *-ėr*, one who numbers. NUM'BERS, n. plu. *-bėrz*, the fourth book of the Old Test. Scrip. NUM'BERLESS, a. not admitting of being counted; innumerable. CARDINAL NUMBERS are one, two, three, etc. ORDINAL NUMBERS are first, second, third, etc. GOLDEN NUMBER, the cycle of the moon, or revolution of 19 years, obtained by adding 1 to the year A.D., and dividing by 19—the quotient being the number of cycles since Christ, and the remainder the *golden number*—so called from having formerly been written in the calendar in gold. ABSTRACT NUMBER, a number considered by itself, as 6. CONCRETE NUMBER, its opposite means a number of specified objects or things, as 6 pence, 6 feet. PRIME NUMBER, a number that can be divided only by unity or 1. SQUARE NUMBER, the product of a number multiplied by itself. WHOLE NUMBER, an integer; not a fraction.—SYN. of 'number, v.': to reckon; numerate; enumerate; tell; amount to; contain; include; consist of;—of 'number, n.': quantity; aggregate; many; harmony; verse; poetry; part; division; badge.

NUMBER FORM: an imaginary form assumed by numerals in the minds of some persons. Number forms vary in their shape, vividness, color, and utility. Usually the part of the framework which is formed by numbers 1-100 inclusive is visualized as nearest to the body and most vivid. The form may appear as two dimensional or three dimensional. Sometimes other sets of facts than numerals are visualized in a definite form, e. g., the days of the week, months of the year, etc. The origin of the forms is generally obscure. They are developed in early childhood and no doubt represent a natural attempt of the mind to render abstract relations concrete.

NUM'BERS (LXX. *Arithmoi;* Heb. *Bamidbar*): fourth book of the Pentateuch, embracing the history of the march of the Israelites through the Desert, with the special laws given during this period as complementary to the Sinaitic legislation. Beginning with the census of the people (whence the name of the book), and the assigning of the special places to each tribe with reference to the sanctuary, the whole people is classified, and the tribe of Levi specially singled out. Ordinances on the purity to be maintained in the camp, the functions of the priests, and a description of the passover, follow. The second portion of the book describes the journey from Sinai to the borders of Canaan, the miraculous sustenance of the people, their dissatisfaction and conse-

quent rejection, with various special laws respecting sacrifices, etc., and the episode of Korah. The third part embraces the first ten months of the 40th year of the wandering—an epoch hurried over with remarkable swiftness by the historian. In quick succession, the renewed strife of the people with their leaders, the message to the king of Moab, the death of Aaron, the defeat of the king of Arad, the punishment of the people by serpents, the march from Hor to Pisga, and the victorious battle against the kings of Sihon and Og, are recounted, and the extraordinary episode of Baalam follows. The further wiles of the alarmed Moabites and Midianites to avert the threatening invasion, and their result, with the second census, are narrated. Moses is warned of his death, and the vital question of his succession is settled. Further laws and ordinances respecting sacrifices and vows, the conquest of the Midianites, and the partition of the country e. of the Jordan among certain tribes, a recapitulation of the encampments in the Desert, a detailed specification of the manner in which the promised land should be divided after its conquest, and the final ordinance of the marriages of heiresses among their own tribe only, so as to preserve the integrity of landed property, make up the remainder of the book.

The Book of Numbers is, like the rest of the Pentateuch, supposed by many modern critics to consist of several documents written by *Elohists* and *Jehovists* respectively. See GENESIS; PENTATEUCH.

NUMBER SYSTEM of Arithmetic: the entire assemblage of numbers, comprising the positive and negative integers, fractions, and incommensurables, and the complex numbers (q.v.). All these together form a two-dimensional system of numbers $a+bi$, where a and b are real and $i=\sqrt{-1}$. Within this system are performed all the processes of arithmetic, algebra, the calculus, etc. The real numbers form a continuous system extending from $-\infty$ to $+\infty$, and may be represented by the points of an infinitely extended straight line, the integers being placed at regular intervals and the rational fractions, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{2}$, . . . lying between them. These rational numbers are so closely crowded on the line that every interval however small contains an infinite number of them. Yet they do not fill out the line completely, for there must still be place for the irrational numbers like $\sqrt{2}$, e, π, ... Each of these irrationals is the limit of a sequence of rationals, thus $\sqrt{2}$ is the limit of the sequence 1, 1.4, 1.41, 1.414, 1.4142, . . ., and similarly every irrational is the limit of an unending sequence of decimals. When all the irrationals have been inserted any convergent sequence tends to a limit already in the system. In modern terminology, our number system is a *perfect assemblage*, *i. e.*, one which includes all its limiting points.

The Greeks, who possessed an acute logical sense of number, made a sharp distinction between number and *quan-*

tity. To them a number was an integer or fraction or a number which could be constructed geometrically, as $\sqrt{2}$ can be represented by the hypotenuse of a right triangle whose sides are each 1. Every number corresponded to a quantity, but not every quantity could be expressed by a number. It is this difference of standpoint which makes the Euclidean theory of proportion so unintelligible to the modern student. Our notion of number is intuitive, instead of logical, and assumes a continuous number system, corresponding to continuous quantity. It dates from the development of Mechanics, with continuously varying time and motion, and is supported by our decimal notation which permits the expression of any quantity to any desired degree of approximation by a decimal fraction. In the general overhauling, to which Mathematics has in recent years been subjected with a view to establishing it in rigorous logical foundations, it has been found necessary to begin with the number system itself. An account of the results may be found in Dedekind's *Essays on the Theory of Numbers* (translation from the German by W. W. Beman). The reader may also consult Klein's *Famous Problems of Geometry* (translated by Beman and Smith) which presents among other interesting material the proof (first given by Hermite and Lindemann) that the number e and π are transcendental, *i. e.*, are not roots of algebraic equations, thus establishing the existence of those higher kinds of number.

The system of rational numbers possesses the curious property that they may be *counted*, not however in their natural order. This is done by writing them all as fractions by giving each integer the denominator 1, then grouping them in sets so that the sum of numerator and denominator is the same for all of each set, and finally counting one set after the other, omitting any number that have previously been reached in the enumeration. Thus the sequence would be 1/1, 1/2, 2/1, 1/4, 2/3, 3/2, 4/1, ... The entire system of continuous numbers on the other hand cannot be counted. It is the simplest type of an uncountable system. Cantor has shown that all the points of a plane or of space can be put in one-to-one correspondence with those of a line, so that no higher type is reached in these cases.

Our number system may be regarded logically as a set of marks based on the two units 1 and $\sqrt{-1}$ and obeying the ordinary laws of addition, subtraction, multiplication and division, and subject also to the further condition that a product does not vanish unless one of its factors vanishes. If any of these conditions is modified, a different system results. See COMPLEX NUMBER, QUATERNIONS. All systems however make use of the common real numbers, which are indeed a fundamental concept of the mind. The differences between systems relate to their algebra and systems of units.

NUMBERS, THEORY OF: branch of Higher Arithmetic dealing with the properties of integers, their relation to

prime numbers, laws of combination, the expression of numbers under different forms, etc. The earliest writer on the subject was Diophantus of Alexandria (300 A. D.), the founder of Diophantine Analysis or solution of equations by integers (or fractions). Given for example the equation $3x+4y=19$, its solutions in positive integers are $x=1$, $y=4$ and $x=5$, $y=1$. If a sum of money, say 85 cents, is to be paid in dimes and quarters, the corresponding equation $10x+25y=85$ has the solutions $x=1$, $y=3$ and $x=6$, $y=1$. The equation $x^2+y^2=z^2$ connecting the lengths of the sides and hypotenuse of a right angled triangle has the integral solutions 3, 4, 5; 5, 12, 13; 7, 24, 25; .... An infinite series of solutions can be found by taking $x=u^2-v^2$, $y=2uv$, $\therefore z=u^2+v^2$, where u and v are any chosen integers. Thus $u=5$, $v=4$ give $x=9$, $y=40$, $z=41$. The equation $x^3+y^3=z^3$ and in general $x^n+y^n=z^n$ $(n>2)$ have no integral solutions, except when x or $y=0$.

An algebraic formula such as $4m+1$ represents an infinite series of integers if we put m successively equal to 0, 1, 2, 3, ... The numbers $4m+1$ are obviously all those that divided by 4 leave the remainder 1. All integers are included in one of the sets $4m$, $4m+1$, $4m+2$, $4m+3$. Instead of 4, any divisor a will serve equally well, giving sets am, $am+1$, $am+2$, ... All the numbers of the same set $am+b$, with b fixed, are said to be *congruent* with respect to the divisor, or *modulus*, a. Congruence is expressed by the sign $\equiv$; thus $17\equiv 5$ mod. 4 means simply that the difference 17–5 is a multiple of 4. Similarly $13\equiv 8$ mod. 5, $9\equiv 2$ mod. 7, etc. The case of greatest interest is when the modulus a is a *prime* number p. Here obtains the celebrated theorem of Fermat which is the foundation of the modern Theory of Numbers. It is as follows: If p is a prime number and x any number not a multiple of p, then

$$x^{p-1}\equiv 1 \text{ mod. p}$$

For example if $p=5$, then taking $x=1$, 2, 3, 4 we find $x^{p-1}=x^4=1$, 16, 81, 256 all of which are $\equiv 1$ mod. 5. For $p=7$, $x=1$, 2, 3, 4, 5, 6 give $x^2\equiv 1$, 4, 2, 2, 4, 1, $x^6\equiv 1$, 64, 8, 8, 64, $1\equiv 1$. By the aid of Fermat's theorem, we can for example solve such a Diophantine equation as $3x+5y=43$, which may be written $3x=43-5y$ or $3x\equiv 43$ mod. 5. Here we multiply both sides by 3^3 and get $3^4x\equiv 43.3^3$ mod. 5. But $3^4\equiv 1$, $\therefore x\equiv 43.3^3\equiv 3.2\equiv 6=1$ mod. 5. The positive solutions of the equation are $x=1$, 6, $y=8$, 5. Fermat's theorem was extended by Euler to the case where the modulus is any integer, not necessarily a prime. It then becomes $x^{\phi(m)}\equiv 1$ mod. m, where $\phi(m)$ is the number of integers less than m and prime to m.

Closely connected with Fermat's theorem is the subject of Quadratic Remainders. These are the smallest remainders mod. p of the squares of all integers. Thus mod. 7 we have for every number x $x^2\equiv 1$, 2, or 4. The quadratic remainder mod. p satisfy $x^{\frac{1}{2}(p-1)}\equiv 1$ mod. p, while the non-remainder satisfy $x^{\frac{1}{2}(p-1)}\equiv -1$ mod. p. Thus -1 is quadratic remainder of every prime number of the form $p=4m+1$, but is non-remainder of the primes $q=4m+3$. Again

Q is quadratic remainder of the primes of the form $p = 8m \pm 1$. Quadratic remainders are employed in factoring large numbers and in determining the forms in which numbers can be expressed. Thus a given number n can be expressed in the form $ax^2 + 2bxy + cy^2$, where a, b, c are given integers, only if $b^2 - ac$ is quadratic remainder of n. For example only primes of the form $4k + 1$ can be expressed in the form $x^2 + y^2$. Thus $41 = 25 + 16 = 5^2 + 4^2$, $233 = 169 + 64 = 13^2 + 8^2$, etc.

Here belongs also Wilson's theorem: A number n is or is not prime according as $(n-1)! + 1$ is or is not divisible by n. Thus $(5-1)! + 1 = 25$, but $(6-1)! + 1 = 121$,

Many other interesting properties of numbers may be cited. Thus the product of any n consecutive integers a, $a+1$, $a+2$, ..., $a+n-1$ is always divisible by n! = 1; 2.3 ...n. The sum of the first n odd numbers is n^2, $1 + 3 + 5 = 9 = 3^2$, $1 + 3 + 5 + 7 = 16 = 4^2$, etc. The sum of the cubes of the first n natural numbers is the square of their sum $1^3 + 2^3 + 3^3 + 4^3 = 100 = (1 + 2 + 3 + 4)^2$, etc. The sum of the coefficients in the expansion of $(a + b)^n$ is equal to 2^n. Every number is the sum of four or less square numbers. Every even number is the sum of two prime numbers (Goldbach's theorem). Two interesting series of numbers are those of Fermat, $2^{2^n} + 1$, and Mersenne, $2^p - 1$ (p a prime number). The former give the number of sides of a regular polygon inscribable in a circle by ruler and compass, provided they are prime, which is the case for $n = 1, 2, 3, 4$. For $n = 5, 6$ and many higher integers, the Fermat numbers are factorable. The Mersenne numbers are prime for $p = 1, 2, 3, 5, 7, 13, 17, 19, 31, 61$; the higher exponents have not been fully investigated.

A composite number can be written in the form $n = p^a q^b r^c \ldots$, where $p, q, r, \ldots$ are its prime factors and $a, b, c, \ldots$ are integers. The number of divisors of n is $(a+1)(b+1)(c+1) \ldots$. Thus for $144 = 2^4.3^2$, the number of divisors is $(4+1)(2+1) = 15$. *Perfect numbers* are those which are equal to the sum of their divisors (the number itself being of course excluded). The even perfect numbers are all of the form $2^{p-1}(2^p - 1)$ when $2^p - 1$ must be prime. No odd perfect numbers are known. *Amicable numbers* are pairs of numbers such that each is the sum of the divisors of the other. Examples are 220 (= 1 + 2 + 4 + 71 + 142) and 284 (= 1 + 2 + 4 + 5 + 10 + 11 + 20 + 22 + 44 + 55 + 110). For other series of numbers see FIGURATE NUMBERS.

The great writers on the Theory of Numbers have been Diophantus (300 A. D.), Fermat (1601–1665), Euler (1707–1783), Lagrange (1736–1813), Legendre (1752–1833), Gauss (1777–1855), and later Kummer, H. J. S. Smith, and Kroneker. Modern works are Mathews, *Theory of Numbers* (1892), Lucas, *Théorie des Nombres* (1891), and especially Eirichlet, *Zahlentheorie* (3d Edition, 1879).

NUMBLES, n. plu. *nŭm'blz*, or UMBLES, n. plu. *ŭm'blz* [F. *nombril*—from L. *umbĭlīc'ŭlus*, a dim. of L. *umbilīcŭs*, the navel, the middle]: the entrails of a deer pig,

etc.; also spelled NOMBLES, n. plu. *nŭm'blz*, and HUMBLES, *hŭm'blz*.

NUMENIUS, n. *nū-mē'nĭ-ŭs:* the scientific name for the curlew.

NUMERAL, n. *nū'mėr-ăl* [It. *numerale;* F. *numéral*, of or belonging to number—from L. *numĕrālis*—from *numĕrus*, a number]: a symbol or character used to express a number (see NUMERALS): ADJ. relating to or expressing number. NU'MERALLY, ad. *-lĭ*. ARABIC NUMERALS are 1, 2, 3, 4, etc. ROMAN NUMERALS are I., II., III., IV., etc. NUMERICAL, a. *nū-mĕr'ĭ-kăl*, or NUMER'IC, a. *-ĭk*, belonging to or consisting in number or numbers. NUMER'ICALLY, ad. *-lĭ*. NUMERARY, a. *nū'mėr-ėr-ĭ*, belonging to a certain number. NUMERATE, v. *nū'mėr-āt*, to point off and read, as figures; to calculate. NU'MERATING, imp. NU'MERATED, pp. NU'MERATOR, n. *-ā-tėr*, the figure or figures above the line in a vulgar fraction, denoting a certain number of the parts into which the whole or integer has been divided. NU'MERABLE, a. *-ă-bl*, that may be numbered. NU'MERA'TION, n. *-ā'shŭn* [F.—L.]: the act or art of pointing off a series of figures acording to their values with the view of expressing them in words (see below). NU'MEROUS, a. *-ŭs* [L. *numerōsus:* F. *numéreux*]: consisting of a great number; being many. NU'MEROUSLY, ad. *-lĭ*.

NU'MERALS: figures or symbols expressing numbers. For Roman and Greek numerals, see NOTATION. The distinctive name *Arabic Numerals* is given to the nine figures or digits and the zero, in almost universal use among civilized nations for this purpose. Both the origin of these figures, and the period at which they became known in Europe, have been subjects of laborious investigation; and it seems now proved beyond doubt that the position system of arithmetic now in use was invented by the Hindus as early as 200 B.C. The zero came later; its use is not verified before 400 A.D. By the eighth century the Arabs had become acquainted with the Hindu system and its figures, including zero. From these figures arose among the Western Arabs the Gubar (dust) numerals, from which our modern numerals are directly descended, through the *apices* of the middle ages. The Arabic system was brought into Italy by Leonardo of Pisa about 1200 A.D., and had made its way into general use by 1500, after a long struggle with the Roman system and the abacus. See Fink *A Brief History of Mathematics* (1900). See also ARITHMETIC.

NUMERA'TION: reading off of numbers that are expressed by figures. As shown in Notation (q.v.), the first figure on the right hand express units; the next, tens; the third, hundreds; and following the same nomenclature with the next three figures, we have the fourth expressing units of thousands; the fifth, tens of thousands; the sixth, hundreds of thousands. The sev-

enth figure, in like manner, expresses units of millions; the eighth, tens of millions; and the ninth, hundreds of millions. When this method is consistently followed out, as is the case with French and other continental arithmeticians, the fourth period, or group of three figures is denominated billions, the first figure of it (the tenth from the extreme right) being, units of billions; the next, tens of billions; etc. Read in this way, the figures 56,084,763,204,504 express fifty-six trillions, eighty-four billions, seven-hundred-and-sixty-three millions, two-hundred-and-four thousands, five-hundred-and-four units. In Great Britain, there is a variation in the mode, the only effect of which is to render it more complicated: thus, after units of millions come tens and hundreds of millions, but then instead of billions we have, according to the current usage, thousands of millions; after this, tens of thousands of millions and hundreds of thousands of millions, and then billions, which occupy the 13th figure from the right, and are reckoned in the same way as millions, so that the next unit or *trillions* does not come in till the 19th figure. The above number, according to the British mode, would be read fifty-six billions, eighty-four-thousand-seven-hundred-and-sixty-three millions, two-hundred-and-four thousands, five-hundred-and-four units. The first method is perfectly symmetrical, keeping throughout to divisions of three figures; the second only keeps to this division up to hundreds of millions, when it changes it for a division into parcels of six figures, which are named from units up to hundreds of thousands of units. The latter mode is, however, gradually falling into disuse.

NUMER'ICAL APERTURE: a term used in optics: the method by which the illuminating and resolving power of high-power microscopic objectives is calculated. Since it became customary to interpose water, oil, or other fluid between the object and the lens, it is found that a water immersion lens of 97½°, and an oil immersion of 82°, give equal results to a dry or air lens of 180°. This obviously depends on the diameter of the back lens of the objective, and this on the refractive index of the medium between lens and object. It is expressed by the formula, $n \sin u$, where n is the refractive index of the medium—air or fluid—and u the semi-angle of aperture. It is thus found that an oil-lens of 180° has a numerical aperture of 1.52 against 1.00 for 180° in air. This only represents the comparative diameters of the effective pencils, and the relative illumination is, of course, obtained by squaring the numerical apertures to get the comparative areas of the pencils. We thus find that an oil-lens of 180° gives 2.310 the illumination of a dry objective of 180°.

NUMERICAL NOTATION: in music, a modern system of indicating single tones or entire chords by means of numerals. The system is especially used in indicating the range of various instruments. Roman numerals

are used in violin music and Arabic figures in compositions. Only four numbers are used for finger-marking on the violin as the thumb is not used in playing that instrument: thus 1 refers to the index finger, 2 to the middle finger, etc. For piano compositions the thumb is marked 1, the index finger 2, the middle finger 3, etc., the old system of indicating the thumb by an x, index 1, middle 2, etc., having been almost completely discarded. In violin music the strings e, a, d, g are represented by the Roman numerals I, II, III, IV respectively, but in ordinary usage Roman figures are used to denote chords; a large figure indicates a major, a small a minor triad. The system was first introduced by G. Weber. See MUSIC; TONES.

NUMIDA, n. *nū'mĭ-dă:* a genus of gallinaceous birds, including the Guinea Fowl (q.v.).

NUMIDIA, *nū-mĭd'ĭ-a* [Gr. *Nomadia*, land of Nomads]: the name given by the Romans to a part of the n. coast of Africa, corresponding to some extent with the modern Algiers. It was bounded on the w. by the river Mulucha (now *Moluya*), which separated it from Mauritania; on the e. by the river Tusca (now *Wadi-el-Berber*), which separated it from the territory of Carthage, the *Africa Propria* of the Romans; on the s., it reached to the chains of Mount Atlas and the Lacus Tritonis, which separated it from the land of the Gaetulians and Interior Libya. The chief rivers were the Rubricatus and the Ampsaga. The inhabitants of Numidia, as of Mauritania, belonged to the race from which the modern Berber are descended. They were a warlike race, and excelled as horsemen; but, like most barbarians, were faithless and unscrupulous. Of their tribes, the *Massyli* in the e., and the *Massæsyli* in the w., were the most powerful. In the grand struggle between the Carthaginians and the Romans, they at first fought on the side of the former, but subsequently the king of the E. Numidians, Massinissa, joined the Romans, and rendered them effectual service in the war with Hannibal. Favored by the conquerors, he united all Numidia under his sway. Of his successors in this kingdom, Jugurtha and Juba are most famous. After the victory of Cæsar over Juba I., in the African war, Numidia became a Roman province B.C. 46; but Augustus afterward gave the w. part—from the river Ampsaga, now Wadi-el-Kibbir—with Mauritania, to Juba II., and the name Numidia became limited to the e. part; and when Mauritania became a Roman province, the w. part was called Mauritania Cæsariensis. Among the Roman *coloniæ* were Hippo Regius, near the mouth of the river Rubricatus; Cirta (residence of the Numidian kings), afterward called Constantina, a name still preserved in Constantine; Sicca, and Rusicada. For the modern history of Numidia, see ALGIERS.

NUMISMATIC, a. *nū′mĭs-măt′ĭk* [L. *num′isma*, money, coin: Gr. *nŏm′ĭsma*, coined money—from *nŏmŏs*, law or usage]: pert. to coin or medals. NU′MISMAT′ICS, n. plu. *-ĭks*, the science or knowledge of coins and medals in regard to their age, name, and place when made (see below): called also NUMIS′MATOL′OGY, n. *-tŏl′ŏ-jĭ*. NUMIS′MATOL′OGIST, n. *-jĭst* [Gr. *logos*, a discourse]: one versed in the knowledge or study of coins and medals. NUMISMATIST, n. *nū-mĭs′mă-tĭst*, one who is skilled in numismatics.

NUMISMAT′ICS: science which treats of coins and medals. A coin is a piece of metal of a fixed weight stamped by authority of government and employed as a circulating medium. A medal is a piece struck to commemorate an event or (rarely) in honor of a person. The study of N. has important bearing on history. Coins have been the means of ascertaining the names of forgotten countries and cities, their position, their chronology, the succession of their kings, their usages—civil, military, and religious—and the style of their art. On their respective coins we can behold undoubtedly accurate representations of Mithridates, Julius Cæsar, Augustus, Nero, Caracalla, and read their features and character.

The metals generally used for coinage are gold, silver, and copper. In each class is comprised the alloy occasionally substituted for it, as electrum (an alloy of gold and silver) for gold, billon for silver, bronze for copper, and potin (an alloy softer than billon) for silver and copper. The side of a coin which bears the most important device or inscription is called the *obverse*, the other side the *reverse*. The words or letters on a coin are called its inscription; an inscription surrounding the border is called the *legend*. When the lower part of the reverse is distinctly separated from the main device, it is called the *exergue* (Gr. *ex ergou*, without the work), and often bears a secondary inscription, with the date or place of mintage. The field is the space on the surface of the coin unoccupied by the principal device or inscription.

The use of coined money cannot be traced farther back than B.C. 9th c. Money, however, as a medium of exchange, existed much earlier, and when of metal it passed by weight, no piece being adjusted to any precise weight, and all money being weighed when exchanged. Early metallic money was in the form of bars, spikes, and rings; the ring money could be opened, closed, and linked in a chain for convenience of carriage.

The Lydians are supposed to have been the first people who used coined money, about B.C. 700 or 800; and their example was soon after followed by the different states of Greece, the earliest Greek coins being those of Ægina. In early stages the process of coining consisted in placing a lump of metal of a fixed weight, and approaching to a globular form, over a die, on which was engraved the religious or national symbol to be impressed. A wedge or punch placed at the back of the metal was held steadily with one hand and struck by a

hammer with the other, till the metal was sufficiently fixed in the die to receive a good impression. The impression was a guarantee of the weight of the piece. From the nature of the process, the earliest coins had a lumpish appearance, and on their reverse was a rough, irregular, hollow square, corresponding to a similar square on the punch, devised for the purpose of keeping the coin steady when struck by the coining hammer. The original coins of Asia Minor were of gold, those of Greece of silver. The earliest coins bear emblems of a sacred character, often embodying some legend regarding the foundation of the state, as the *phoca* or seal on the coins of the Phocians, which alludes to the shoal of seals said

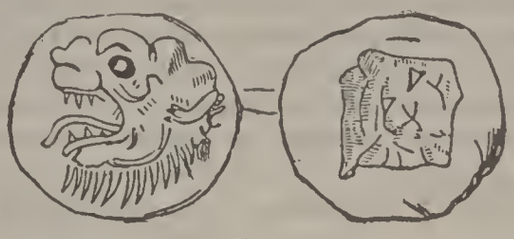


Fig. 1.

to have followed the fleet during the emigration of the people. Fig. 1 represents a very early double stater of Miletus, in Ionia, of which the type is the lion's head, derived from Persia and Assyria, and associated with the worship of Cybele—a symbol continued in the later coinage of Miletus. Types of this kind were succeeded by portraits of protecting deities. The earliest coins of Athens have the owl, as type of the goddess Athene; at a later period, the head of the goddess herself takes its place, the owl afterward reappearing on the reverse. The punch-mark, at first a rudely roughed square, soon assumed the more sightly form of deep, wedge-like indents, which in later specimens become more regular, till they form themselves into a tolerably symmetrical square. In the next stage the indents become shallower, and consist of four squares forming one large one. The surrounding of the punch-mark with a band bearing a name, and the introduction of a head in its centre, as in the annexed figure (fig. 2), gradually led to the perfect reverse. There is a remarkable series of so-called 'encased' coins struck in Magna Græcia, of which the reverse is an exact repetition in concave of the relief of the obverse. These coins are thin, flat, sharp in relief, and beautifully executed.

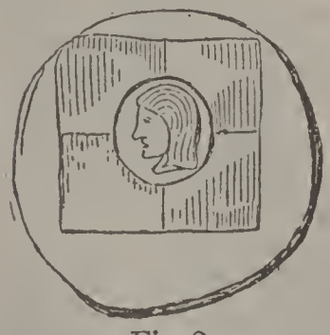


Fig. 2.

The leading coin of Greece and the Greek colonies was the stater, so called because founded on a standard of weight generally received before the introduction of coined money. There were double staters and half, third, and quarter staters, and the stater was equivalent

in value to six of the silver pieces called drachmæ. The obolus was one-sixth of the drachma, at first struck in silver, in later times in copper.

The inscriptions on the earliest Greek coins consist of a single letter, the initial of the city where they were struck. The remaining letters, or a portion of them, were added afterward, the name, when in full, being in the genitive case. Monograms sometimes occur in addition to the name, or part name, of the place. The first coin bearing the name of a king is the tetradrachm (or piece of four drachmæ) of Alexander I. of Macedon.

Among the early coins of Asia, one of the most celebrated is the stater Daricus or Daric, named from Darius Hystaspes. It had for symbol an archer kneeling on one knee, and seems to have been coined for the Greek colonies of Asia by their Persian conquerors. In the reign of Philip of Macedon, the coinage of Greece had attained its full development, having a perfect reverse. One of the earliest specimens of the complete coin is a beautiful medal struck at Syracuse, with the head of Proser-

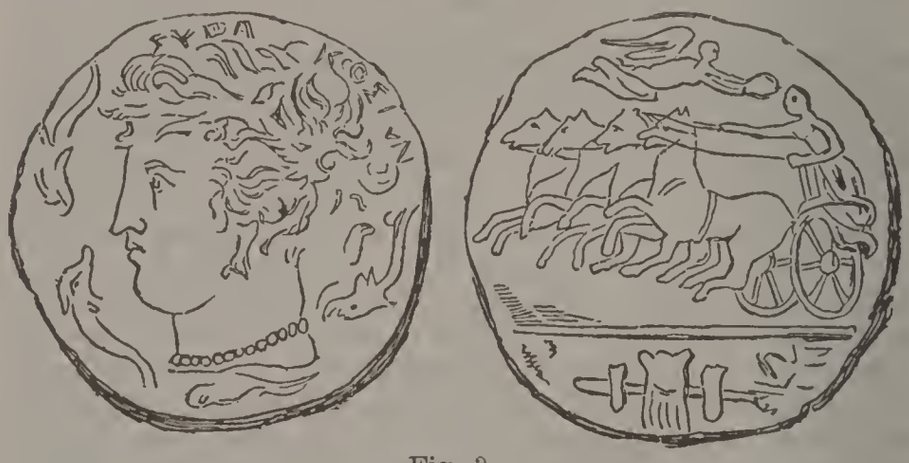


Fig. 3.

pine accompanied by dolphins, and for reverse a victor in the Olympic games, in a chariot, receiving a wreath from Victory—a type found also on the reverse of the staters of Philip of Macedon, known as Philips, and largely imitated by other states. Coins of Alexander the Great are abundant, many having been struck after his conquests in the Greek towns of Asia. A rose distinguishes those struck at Rhodes, a bee those struck at Ephesus, etc.; these all are types generally accompanying the figure of Zeus on the reverse; on the obverse is the head of Hercules, which has sometimes been supposed to be that of Alexander himself. It seems, rather, that the conqueror's immediate successors were the first who placed their portraits on the coins, and that under a shallow pretense of deification—Lysimachus as a descendant of Bacchus, and Seleucus of Apollo, clothed in the attributes of these deities. Two most beautiful and important series of Greek coins are those of the Seleucidæ, in Asia, of silver; and of the Lagidæ or Ptolemies, in Egypt, of gold.

In Palestine there is an interesting series of coins founded on the religious history of the Jewish nation and assigned to Simon Maccabæus. They are shekels and half-shekels, equivalent to two Attic drachmæ and one drachma respectively. The shekels bear on the obverse the pot of manna, with the inscription 'Scheke! Israel' (the Shekel of Israel); on the reverse is Aaron's rod with three flowers, and the legend 'Ierouschalim kedoschah' (Jerusalem the Holy). The inscriptions are in the Samaritan character. The successors of Simon assumed the title king, and placed their portraits on the coins, with inscriptions in Greek as well as in Hebrew.

Roman coins belong to three different series, known as the Republican, the Family, and the Imperial.

The so-called Republican, the earliest coinage, began at an early period of Roman history, and subsisted till about B.C. 80. Its standard metal was copper, or rather *æs* or bronze, an alloy of copper. The standard unit

Fig. 4.

was the pound weight divided into twelve ounces. The *æs*, or *as*, or pound of bronze, is said to have received a state impress as early as the reign of Servius Tullius, B.C. 578. This gigantic piece was oblong like a brick, and stamped with the representation of an ox or sheep, whence the word *pecunia*, from *pecus*, cattle. The full pound of the as was gradually reduced, always retaining the 12 (nominally) uncial subdivisions, till its actual weight came to be no more than a quarter of an ounce. About the time when the as had diminished to nine ounces, the square form was exchanged for the circular. This large copper coin, called the 'as grave,' was not struck with the punch, but cast, and exhibited on the obverse the Janus bifrons; and on the reverse, the prow of a ship, with the numeral I. Of the fractions of the as, the sextans, or sixth part, generally bears the head of Mercury, and the uncia, or ounce piece (fig. 4), that of Minerva; these pieces being further distinguished by dots or knobs, one for each ounce. There were circular pieces as high as the decussis, or piece of 12 asses, presenting a head of Roma (or Minerva); but none are known to have been coined till the weight of the as had diminished to four ounces. The Roman uncial coinage extended to the other states of Italy, where a variety of

types was introduced, including mythological heads and animals. In the reign of Augustus, the as was virtually superseded by the sestertius, called by numismatists the first bronze, about the size of an English penny, which was at first of the value of $2\frac{1}{2}$, afterward of 4, asses. The sestertius derived its value from the silver denarius, of which it was the fourth. The half of the sestertius was the dupondius (known as the second bronze), and the half of the dupondius was called the assarium, an old name of the as. The assarium is known to numismatists as the third bronze.

Silver was coined at Rome first about B.C. 281, the standard being founded on the Greek drachma, then equivalent in value to ten asses; the new coin was therefore called a denarius, or piece of ten asses. The earliest silver coined at Rome has on the obverse the head of Roma (differing from Minerva by having wings attached to the helmet); on the reverse is a quadriga or biga, or the Dioscuri. Among various other types which occur in the silver of the Italian towns subject to Rome are the horse's head and galloping horse, both very beautiful. During the social war, the revolted states coined money independently of Rome, and used various devices to distinguish it as Italian and not Roman money.

The earliest gold coins seem to have been issued about B.C. 90, and consisted of the scrupulum, equivalent to 20 sestertii, and the double and treble scrupulum. These pieces bear the head of Mars on the obverse, and on the reverse an eagle standing on a thunderbolt, with the inscription 'Roma' on the exergue. The large early republican coins were cast, not struck.

The Family Coins begin about B.C. 170; and about B.C. 80 they entirely supersede the coins above described. Those families who successively held offices connected with the public mint acquired the right first to inscribe their names on the money, afterward to introduce symbols of events in their own family history. These types gradually superseded the natural ones; the portrait of an ancestor followed; and then the portrait of a living citizen, Julius Cæsar.

Under the empire, the copper sestertius, which had displaced the as, continued the monetary standard. A magnificent series remains of the first bronzes of the emperors from Augustus to Gallienus. While it was the privilege of the emperors to coin gold and silver, copper could be coined only *ex senatusconsulto*, which from the time of Augustus was expressed on the coins by the letters S.C., or EX S.C. The obverse of the imperial coins bears the portraits of the successive emperors, sometimes of the empress or other members of the imperial family; and the reverse represents some event, military or social, of the emperor's reign, sometimes allegorized. The emperor's name and title are inscribed on the obverse, and sometimes partly continued on the reverse; the inscription on the reverse generally relates

to the subject delineated; and toward the close of the 3d c., the exergue of the reverse is occupied by the name of the town where the coin is struck. The coins of Augustus and those of Livia, Antonia, and Agrippina the Elder have much artistic merit. The workmanship of Nero's sestertii is very beautiful. The coins of Vespasian and Titus commemorate the conquest of Judæa. The Coliseum appears on a sestertius of Vespasian. The coins of Trajan are noted for their architectural types. Hadrian's coins commemorate his journeys. The coins and medals of Antonine, Marcus Aurelius, and the two Faustinæ are well executed; as are also those of Commodus, of whom a remarkable medallion relates to the conquest of Britain. There is a rapid falling off in design after the time of Commodus, and base silver comes extensively into use in the reign of Caracalla. Gallienus introduced the practice of coining money of copper washed with silver.

The colonial and provincial money of this period was very inferior to that coined in Rome. In the coins of the provinces which had been formed out of the Greek empire, the obverse bears the emperor's head, and the reverse generally the chief temple of the gods in the city of coinage; the inscriptions are in Greek. In the imperial coins of Alexandria appear such characteristic devices as the heads of Jupiter Ammon, Isis, and Canopus, the sphinx, the serpent, the lotus, and the wheat-ear. Colonial coins were distinguished at first by a team of oxen, afterward by banners, the number of which indicated the number of legions from which the colony had been drawn.

After the time of Gallienus, the colonial money and the Greek imperial money, except that of Alexandria, ceased, and much of the Roman coinage was executed in the provinces, the name of the town of issue appearing on the exergue. Diocletian introduced a new piece of money, called the follis, which became the chief coin of the lower empire. The first bronze has disappeared after Gallienus, and the second disappears after Diocletian, the third bronze diminishing to $\frac{1}{20}$ of an ounce. With the establishment of Christianity under Constantine, a few Christian types are introduced. The third bronze of that emperor has the Labarum (q.v.), with the monogram IHS (q.v.). Large medallions called *contorniati*, encircled with a deep groove, belong to this period, and seem to have been prizes for distribution at the public games. Pagan types recur on the coins of Julian; and after his time the third bronze disappears.

The money of the Byzantine empire forms a link between ancient and modern coins. The portrait of the emperor on the obverse is after the 10th c. supported by some protecting saint. The reverse has at first such types as Victory with a cross, afterward a representation of the Savior or the Virgin; in some instances, the Virgin supporting the walls of Constantinople. Latin is gradually superseded by Greek in the inscriptions, and

wholly disappears by the time of Alexius I. The chief gold piece was the solidus or nomisma, long famed in commerce for its purity, and circulated largely in w. as well as e. Europe.

Of the coins of the middle ages, the most important is the silver denier or penny, derived from the Latin denarius. Its half was the obole, first of silver, afterward of billon. Coins of this description were issued in the German empire, France, England, and the Scandinavian states, and in many cases by ecclesiastical princes and feudal lords as well as sovereigns. The obverse of the regal coin of the early middle ages is generally the bust of the sovereign, and the reverse a Greek cross, accompanied by the royal name or title, and the place of mintage or the moneyer (see MINT). The arms of the country were introduced in the 12th c., in conjunction with the cross, and afterward superseded it. In the 13th and 14th c., coins began to be issued by free imperial cities or corporations of towns; and there prevailed extensively throughout Germany and other parts of Europe a thin piece called a bracteate, in relief on one side and hollow on the other, often bearing not a single letter, rarely a full inscription. Till the 14th c., the relief of the mediæval coins is very inconsiderable, the pieces are thin, and the art is poor.

Britain received the Roman money on its subjugation. Constantine seems to have had a mint in London, and the

Fig. 5.

Roman currency continued to circulate for a time after the departure of the conquerors. The first independent coinage, however, shows hardly a trace of the influence of Rome; it consists of two small coins, called the skeatta and styca, the former of silver, the latter of copper. Both seem to belong solely to the Saxon kingdom of Northumbria; they are without inscriptions; a bird, a rude profile, and several unintelligible symbols appear on them, and their art is of the most debased kind. In the other kingdoms of the heptarchy, silver pennies were coined, first intended to be $\frac{1}{240}$ of a pound weight; on the disappearance of skeattæ and stycæ, they form, with the occasional addition of half-pennies, the sole currency of England till the reign of Edward III. The pennies of the heptarchy bear the name of the king or of the moneyer; a cross sometimes appears after the introduction of Christianity, and in later times a rude head of the king or queen. The pennies of the Saxon and Danish sole monarchs of England have a some-

what similar character. Alfred's earlier coins have a grotesque-looking portrait, and on the reverse a monogram of London; in his later coins the head disappears, and a cross and circle take its place. A cross, variously ornamented with three pellets in each angle, continues to be the usual reverse of the Saxon, Norman, and Plantagenet coins. The coins of Edward III. are a great artistic advance on those that preceded them. The silver coinage of that king consisted not only of pennies, half-pennies, and farthings, but also of groats and half-groats. The obverse of the groat bears a conventional crowned head within a flowered circle of nine arches, the words 'Dei Gratia' and the title 'Rex Franciæ' appearing for the first time in the legend. The reverse has the motto 'Posui Deum adjutorem meum,' which continued on the coinage till the time of Edward V. But the great numismatic feature of Edward III.'s reign is the issue of gold nobles, worth six shillings and eightpence. The obverse of these beautiful coins represents the king in a ship, a sword in his right hand, in his left a shield with the quartered arms of France and England. The reverse is a rich cross flory within a circle of eight arches, and a lion under a crown in each angle of the cross, the legend being 'Ihesus autem transiens per medium illorum ibat.' Half and quarter nobles also were coined. The noble having increased in value, a coin called an angel, of the former value of a noble, was issued by Henry VI. and Edward IV. The obverse represented St. Michael transfixing a dragon; the reverse a ship, with a cross for the mast.

As we approach the period of the Reformation, the coinage gradually becomes more ornate. The nobles coined by Edward IV., after the value of that coin had been fixed at ten shillings, were called rials (a name derived from a French coin), and the double rial or sovereign was coined first by Henry VII. The obverse has the king on his throne, with sceptre and orb, and on the reverse, in the centre of a heraldic full-blown rose, is a shield with the arms of France and England. The testoon, or shilling, valued at 12 pence, also appeared first in this reign, with the royal profile crowned on the obverse, and the royal arms quartered by the cross on the reverse. A great debasement of the coinage took place in the reign of Henry VIII. The reverse of the farthings of that monarch bears a portcullis, that of the shillings a rose surmounted by a crown, and of the sovereigns, the royal arms supported by a lion and dragon. A noble was coined with St. George and the dragon on the obverse, and on the reverse a ship, with three crosses for masts and a rose on the centre mast. On the coins of Henry VIII., the title 'Hiberniæ Rex' first appeared, former kings having styled themselves only 'Dominus Hiberniæ,' Ireland not being accounted a kingdom. Under Edward VI., the silver coins called crowns and half-crowns appear, having for device the king crowned on horseback, in the armor of the period. They derived

their names from coins, circulating on the continent, which had for device a crown. The royal arms in an oval shield, without the cross, are introduced as the reverse of the shilling. From this period there is a very obvious decline in the artistic feeling of the English coins. On some of the shillings of Mary, her bust and that of Philip face each other, the insignia of Spain and England impaled occupying the reverse; afterward the king's head occupies one side of the coin, and the queen's the other. Half-sovereigns, or rials, and angels were coined of the old type of Edward IV. The great event in the coinage of Elizabeth's reign was the temporary introduction of the mill and screw, instead of the hammer and punch, producing coins of a more regular and workmanlike appearance. The profile bust of James I., crowned and in armor, appears on his shillings and smaller pieces; on his crowns and half-crowns he is represented on horseback; on the reverse are the quartered arms of the three kingdoms (the harp of Ireland appearing for the first time on the coinage), with the motto 'Que Deux conjunxit nemo separet.' Copper farthings, with crown, sceptre, and sword on the obverse, and a harp on the reverse, were coined for England as well as Ireland, the first copper money issued in England since the styca. Private tokens of copper, issued by tradesmen and others, had, however, been in circulation before, and came again into use to a large extent at a later period. Charles I. coined ten and twenty shilling pieces of silver, the former a very noble coin, with a representation of the king on horseback. A crown struck at Oxford bears on the obverse the king on horseback, with a representation of the town, and on the reverse the heads of the Oxford declaration. The guinea, first coined in this reign, was so called from the metal being procured from the coast of Guinea; its original value was but 20 shillings.

The coins of the Commonwealth exhibit a shield with the cross of St. George surrounded by a palm and olive branch, and have for legend 'The Commonwealth of England.' On the reverse are two shields accollée, with the cross of St. George and the harp of Ireland, and the motto 'God with us.' Coins far superior in character were executed by Cromwell, with his laureated bust and title as Protector, and on the reverse a crowned shield quartering the cross of St. George, of St. Andrew, and the harp, with the Protector's paternal arms in surtout; but few of these were issued. In the early coins of Charles II., that monarch is crowned, and in the dress of the time; in his later money he is in conventionalized Roman drapery, with the head turned to the left; and since that time it has been the practice to turn every king's head the reverse way from that of his predecessor. The four shields on the reverse are disposed in the form of a cross (an arrangement which continued till the reign of George II.), and on the edge of the crowns and half-crowns is the legend 'Decus et tutamen.'

Charles II. issued a copper coinage of half-pennies and farthings; on the former appears the device of Britannia, taken from the Roman coins relating to Britain. Pennies were not coined till George III.'s reign. The coins of William and Mary have the profiles of the king and queen one over the other, and the shields of the three kingdoms in the form of a cross on the reverse, with Nassau in the centre. The coinage of William alone, after the death of Mary, is of somewhat improved design, Sir Isaac Newton being then master of the mint. Little change in the general design of the coin occurs in the reigns of Anne and George I. On the accession of the House of Hanover, the Hanoverian arms are placed in the fourth shield, and George IV. substituted a quartered shield, with Nassau in surtout, for the four shields on the reverse of his gold coins. During the greater part of George III.'s reign, the coinage was utterly neglected, and the silver pieces in circulation were worn perfectly smooth. When coins were at last issued, the Roman conventionalism of the previous reigns gave way to a then fashionable Greek conventionalism. The quartered shield supplanted the four shields, and on the reverse of the crown appeared a Grecianized St. George and the dragon. George IV.'s bust is taken from Chantrey's statue; the rose, the thistle, and the shamrock, united under a crown, appear on the reverse of his shilling. Silver groats were issued in the reign of William IV. The ensigns of Hanover disappeared at the beginning of the present reign; the reverse of the shilling is even poorer than that of George IV.—the words 'One shilling' occupy the field, surrounded by an oak branch and a laurel branch; silver pieces of threepence have been introduced. But the principal monetary event is the issue of the silver florin, in value equivalent to two shillings, looked on as a step toward the institution of a decimal coinage. It represents the head of the queen crowned, with the legend in old English character; and for reverse the four shields are once more placed in the form of a cross.

No native Scottish coinage existed earlier than the 11th c. Coins are extant of Somerled, Prince of the Isles, of that century, and of Alexander I. of the century following. The silver pennies of William the Lion, and Alexander II. and III., are like contemporary English money, but ruder, and bear the names of the moneyers and place of mintage, generally Edinburgh, Perth, or Berwick. The profiles on the coins of John Balliol, Robert Bruce, and David II. are attempts at portraiture. A remarkable gold piece, coined first by Robert II., is the St. Andrew, with the arms of Scotland on the obverse, and St. Andrew on his cross on the reverse. In the four succeeding reigns, the weight of the silver coins rapidly decreased, and coins of billon, or base metal, were issued, nominally pennies, but three and a half of which eventually passed for a silver penny. The evil increased, and baser and baser alloy was used. Groats of

billon, known as placks and half-placks, were coined by James III. James IV.'s coins have a characteristic portrait and a good deal of artistic feeling. James III. and IV. issued well-executed gold pieces, called unicorns and riders, the type of the one being the unicorn, and of the other the king on horseback. A still more beautiful coin was the gold bonnet-piece of James V., so called from the cap in the king's portrait. Of Mary, there is a great variety of interesting pieces. The portrait is sometimes crowned, sometimes uncrowned, and on the coin issued soon after Francis's death has a widow's cap and high-frilled dress. The types in James VI.'s reign also are very various. On his accession to the English throne, the relative value of English and Scottish coins was declared to be as 12 to 1. The coins afterward issued from the Scottish mint differed from the English, chiefly in having Scotland in the first quarter in the royal shield. The last Scottish gold coinage consisted of pistoles and half-pistoles of Darien gold, about the size of a guinea and half-guinea, struck by William III.; the pistole distinguished by a rising sun under the bust of the king.

The coinage of Ireland is scanty and uninteresting compared with that of Scotland. The coins of English monarchs struck in Dublin resemble much those current in England. Henry VIII. first placed a harp on the Irish coins.

In France, the earliest coins are those of the Merovingian kings, rude imitations of the late Roman and early Byzantine money, and mostly of gold. Under the Carlovingian dynasty, deniers and oboles are the prevailing coinage, remarkably rude in fabric, without portrait, and bearing the name of the king and place of mintage. Some coins of Charlemagne, struck at Rome, are of better workmanship. They contain one letter of 'Roma' at each extremity of the cross, with the legend 'Carolus IP.' The coinage improved under the Capetian kings; the fleur-de-lis appears in addition to the cross. In the 13th c., gold pieces were issued, and, in the time of Philip VI., both the design and the execution of the coins are beautiful. The coins of Louis XII. are the first that bear the royal portrait. The modern coinage may be said to begin under Henry II., whose portrait is good. The seigneurial coins of France in the middle ages are of considerable importance, and the medals of Louis XIV. and Napoleon I. are much more interesting than the modern coins.

The mediæval coinage of Italy is of great interest. The money of the Lombard kings of Italy and dukes of Benevento is little inferior to that of the Greek emperors. There is a beautiful series of gold and silver pieces belonging to Venice, bearing the names of the doges, and having generally for type the doge receiving the gonfalon, or standard of St. Mark. The gold florins of Florence, with the lily for device, are no less celebrated, and were imitated by other states. Florence had also a

remarkable series of medals, with admirable portraits of persons of note. The coins of the popes, from Hadrian I. down to the 14th c., bear the names of the pope and the emperor of the west; those of later date are beautiful in execution, and have seated portraits of the pontiffs, with the cross-keys and mitre for reverse. A remarkable series of medals commemorates the chief events of each reign, one of which, struck after the massacre of St. Bartholomew, has for type an angel slaying the Huguenots, and the inscription 'Ugonottorum strages.' The coins of the Norman princes of Naples, struck in Sicily, have the legends partly or wholly in Arabic. Malta has a series, with the arms and effigies of the grand-masters.

The mediæval money of Germany comprises coins of the emperors, the electors, the smaller princes, the religious houses, and the towns. The imperial series is extensive and very interesting; though, till near the close of the middle ages, it is rather backward in its art. About the Reformation period, however, there are vigorous portraits both on its current coins and on the medals, and on those double dollars which are virtually medals. The coins of the dukes of Saxony, with their portraits, are equally remarkable. The coins of the archbishops of Cologne, Mainz, and Treves form a very interesting series, the first especially, with a representation of the cathedral.

The coins of the Low Countries resemble those of France and Germany. The Dutch medals are of interest, especially those struck in commemoration of events in the war with Spain.

The coins of the Swiss cantons and towns during the early period of Swiss independence bore the heraldic shield of each, drawn with vigorous grotesqueness. There are also pieces struck by ecclesiastical lords, and by different families who had a right of coinage.

The coins of Spain begin with those of the Gothic princes, chiefly of gold, and on the model of the trientes and semisses of the lower empire. Some of the early pieces have a rude head of the monarch on one side, and of the emperor on the other. Afterward, the obverse bears the profile of the monarch, and the reverse a cross of some description, with the name of the place of mintage, and the word 'Pius' for legend. In later times, there are two interesting series of coins, belonging to the kingdom of Aragon and to the kingdom of Castile and Leon.

The coinages of Norway and Sweden at first resembled the British, and afterward the German type. From the 10th to the 14th c., bracteates were issued by the ecclesiastics. The coinage of Hungary begins in the 11th c., and has the portraits of the monarchs. The Russian coinage is Byzantine in character and rude in art. The earliest pieces are the silver darga of the 14th c., of oblong shape, with representations of the prince on horseback and various legendary subjects. Peter the Great introduced the usual European type. There is an im-

portant series of bronze coins of the Crusaders, beginning with Tancred and continuing till the end of the 15th c., including money of the kings of Cyprus and Jerusalem, and other princes established in the East.

In India, the succession of the kings of Bactria, remotest of the dynasties founded on the ruins of Alexander's empire, has become known only through their recently discovered coins. There are early rude Hindu coins of the Gupta line, with figures of the Brahminical divinities of a type still in use.

Of the coins of the Mohammedan princes, the oldest gold pieces are the bilingual coins of cities of Syria and Palestine, of the middle of the 7th c. (A.H. 78), barbarous imitations of the latest Byzantine money of Alexandria. Most of the Mohammedan coins are covered exclusively by inscriptions expressive of the elementary principles of the Mohammedan faith. For some centuries, no sovereign except the caliph was allowed to inscribe his name on the coin. Large gold coins of great purity were issued by the Moslem kings of Granada in Spain.

The high prices given for ancient coins have led to numerous forgeries from the 15th c. onward: against these imitations, collectors require to be on their guard.

Among the best works on N. are: Eckhel, *Doctrina Numorum Veterum* (Vienna 1792–98); Hennin, *Manuel de Numismatique Ancienne* (Paris 1830); Grasset, *Handbuch der alten Numismatik* (Leipzig 1852–3); Leake, *Numismata Hellenica* (London 1854); Ruding's *Annals of the Coinage of Great Britain* (London 1840); Patrick's *Records of the Coinage of Scotland* (1877); Leblanc, *Traité Historique des Monnoies de France* (Paris 1690); Cappe, *Die Münzen der Deutschen Kaiser* (1850); Marsden, *Numismata Orientalia Illustrata* (London 1823–25); Boutkovski, *Dictionnaire Numismatique* (Leipzig 1877).

NUMMARY, a. *nŭm'mėr-ĭ*, or NUM'MULAR, a. *-mū-lėr* [L. *num'ulus* or *num'mulus*, money—from *nummus*, a coin]: having the character or form of a coin; in heaps like rolls of money; flattened out like a piece of money.

NUMMULITES, n. *nŭm'mū-līts*, or NUMMULINA, n. *nŭm'ū-lī'nă* [L. *nummus*, a coin; Gr. *lithos*, a stone]: extensive class of fossil many-chambered foraminifera —so called from their general resemblance to a coin or piece of money—found in inconceivable numbers in the rocks of the tertiary strata, which hence are called *Nummulite Limestone* or *Nummulitic Limestone*. NUM'MULIT'IC, a. *-lĭt'ĭk*, pert. to.—*Nummulites* are a genus of fossil foraminifera, the shells of which form immense masses of rock of Eocene age. More than 50 species have been described. They are circular bodies of lenticular shape, varying in magnitude from the merest point to the size and shape of a large coin. In Egypt, where the whole of the Mokkadam Mts., from whose stone the pyramids were built, is formed of them, the natives call them 'Pharaoh's Pence.' The shell is composed of a series of small chambers arranged in a concentric manner. The growth of the shell takes place not only around the circumference, but each whorl invests all the preceding whorls, so as to form a new layer over the entire surface of the disk, thus adding to the thickness as well as the breadth, and giving the fossil its lenticular form. A thin intervening space separates each layer from the one which it covers, and this space at the margin swells out to form the chamber. All the internal cavities, however, seem to have been occupied with the living sarcode, and an intimate connection was maintained between them by means of innumerable parallel tubuli, which everywhere pass from one surface to another, and which permitted the passage of the sarcode as freely as do the minute pores or foramina of the living foraminifera. *Nummulite Limestone* is an important member of the Middle Eocene period, consisting of a limestone composed of nummulites held together by a matrix formed of the comminuted particles of their shells and of smaller foraminifera. It forms immense masses of the strata raised up on the sides of the Alps and Himalayas, and may be traced as a broad band often 1,800 m. in breadth, and frequently of enormous thickness, from the Atlantic shores of Europe and Africa, through w. Asia, to n. India and China: it is known to cover also vast areas in N. America.

NUMSKULL, n. *nŭm'skŭl* [*numb*, and *skull*]: a dunce; a blockhead.

NUN, n. *nŭn* [mid. L. *nunna;* It. *nonna*, a grandmother, the first nuns being naturally elderly women]: woman devoted to a religious life under a vow of celibacy, poverty, and obedience to a superior, and who lives secluded from the world in a nunnery: a female recluse. NUN'NISH, a. *-nĭsh*, pert. to a nun. NUNNERY, n. *nŭn'-nĕr-ĭ*, a house inhabited by nuns.—The word *Nun* is found in use as a Latin word as early as the time of St. Jerome (*Ep. to Eustachius*, p. 22, c. 6). For the general characteristics of the religious orders, see MONACHISM: also, titles of the several orders. Notable among the distinctive peculiarities of the religious orders of females is the strictness—in the regularly authorized orders of nuns—of the 'cloister,' or inclosure, which no extern is ever permitted to enter, and beyond which the nuns are never permitted to pass, without express leave of the bishop. The superiors of convents of nuns are called by the names Abbess, Prioress, and, in general, Mother Superior. They are, ordinarily speaking, elected by chapters of their own body, with approval of the bishop, unless the convent be one of the class called exempt houses, which are immediately subject to the Holy See. The ceremony of the solemn blessing or inauguration of the abbess is reserved to the bishop, or to a priest delegated by the bishop. The authority of the abbess over her nuns is very comprehensive; but a precise line is drawn between her powers and those of the priestly office, from which she is strictly debarred. The name Nun is given in general to the sisters of all religious congregations of females who live in retirement and are bound by rule; but it is primitively and properly applicable only to sisters of the religious orders strictly so called: see MONACHISM: MONASTERY.

NUNC DIMITTIS, *nŭngk dī-mĭt'ĭs* [L. 'Now lettest thou depart'—the opening words]: the canticle of Simeon (Luke ii. 29–32), which forms part of the compline office of the Roman Breviary and of the vesper office in the Greek Chh., and is retained in the evening service of the Anglican Chh., where it follows the second lesson. On the great festivals in Lent, the music of this canticle is especially grand and imposing.

NUNCHEON, n. *nŭn'shŭn* [from an older form, *noneschenche*—from *none*, noon; *schenche*, a pouring out of drink—from L. *nona*, the ninth hour, and AS. *scencan*, to pour out drink; Dut. *schenken*, to pour out; Icel. *skenkja*, to serve drink]: in *OE.*, a midday meal. *Note.*—The NUNCHEON or NONESCHENCHE signifies literally the 'noon-drink,' the latter part being derived from AS. *sceanc*, a shank; hence a hollow bone, or bone of the leg, a pipe that could be thrust into a cask to tap it or draw off the contained liquor; O. Dut. *schenkkan*, a pot with a pipe to pour out—see Skeat, also note under LUNCH.

NUNCIO, n. *nŭn'shĭ-ō* [It *nunzio;* Sp. *nuncio*—from L. *nuntĭus* or *nuncĭus*, a messenger: F. *nonce*]: messenger, or one sent with announcement: specifically, one of the superior grade of ambassadors sent by the pope to foreign courts: see LEGATE. A nuncio is an ambassador to the court of an emperor or king. The ambassador to a republic, or to the court of a minor sovereign, is called INTERNUNCIO. NUN'CIATURE, n. *-ă-tūr*, office of a nuncio.

NUNCUPATIVE, a. *nŭn-kū'pă-tĭv* [L. *nuncupātus*, called or named: It. *nuncupativo;* F. *nuncupatif*, nuncupative]: publicly; declaratory, existing only in name; nominal; verbal; not written; also NUNCU'PATORY, a. *-pă-tėr-ĭ.—Nuncupative Will*, will made by word of mouth. As a general rule, no will is valid unless in writing and signed by the testator; but in cases of soldiers and sailors, a verbal or nuncupative will is held to be good, on the ground that there is often no time to draw up a formal will in writing.

NUNEATON, *nŭn-ē'ton:* small market-town of England, county of Warwick, 18 m. n.e. of the town of Warwick. It contains a small parish church in Gothic; and its Free Grammar School was founded by Edward VI. 1553. Ribbons and cotton goods are manufactured. Pop. 25,000.

NUÑEZ CABEZA DE VACA, *nôn'yĕth kâ-bā'thâ dā vâ'kâ*, ALVARO: about 1490–1564: chief officer under Narvaez, in the Spanish expedition to Florida 1527, which resulted in shipwreck and the death of Narvaez. N. escaped with a few followers, reached the mainland w. of the Mississippi, penetrated the interior, and, after friendly intercourse with the natives, reached the Spanish settlements on the Pacific coast 1536, after 8 years of wandering and hardship. Returning to Spain 1537, he was appointed *adelantado* of the province of the La Plata 1540. Shipwreck compelled him to go to Paraguay, which country he explored with 150 followers, leaving his ships to proceed to Buenos Ayres. He passed through the country of the Guaranís, and with their assistance descended the La Plata and reached Asuncion, which he made his headquarters, 1542, Mar. 15. He explored the country, subjugated several tribes, and at length, having aroused the jealousy of his lieut., Domingo de Irala, was accused by him, sent to Spain, and banished to Africa by the council of the Indies. The king recalled him 8 years afterward, pensioned him, and appointed him judge of the supreme court at Seville. A published account of his adventures was issued at Valladolid 1544, and has been frequently reprinted. It has also been translated into French and English. He died at Seville.

NUN'QUAM INDEB'ITATUS [L. never indebted]: law term meaning, in an action for debt, a plea that the defendant never was indebted. By some recent codes, the defendant is no longer allowed to deny generally the facts alleged by the plaintiff.

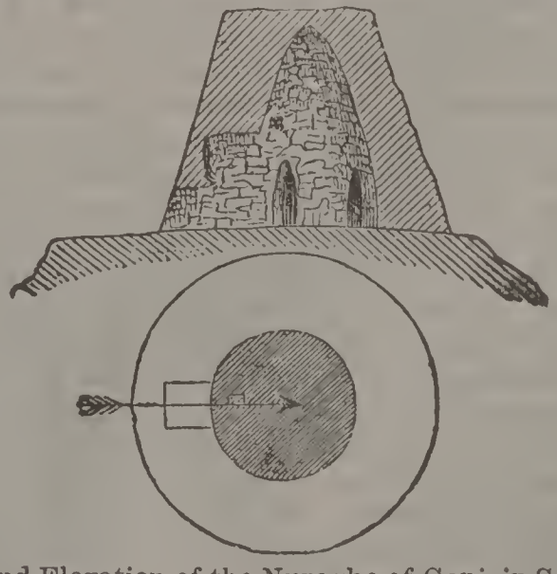
NUPHAR, *nū'fâr:* genus of yellow water-lilies: see WATER-LILY.

NUPTIAL, a. *nŭp'shăl* [F. *nuptial*—from L. *nuptĭālis*, belonging to a marriage—from *nuptĭæ*, a wedding, a marriage—from *nupta*, a bride—from *nubĕrĕ*, to cover or veil, because a bride was veiled]: pert. to a marriage; constituting marriage. NUP'TIALLY, ad. *-lĭ*. NUPTIALS, n. plu. *nŭp'shălz*, marriage; ceremony of marriage.

NURAGHE, *nû-râ'gā*, or NURHAG, *nû-râg':* structure of conical shape, rising 30 or 40 ft. above the ground,

View of the Nuraghe of Goni, in Sardinia.

with two or three stories of domed chambers connected by a spiral staircase. They are peculiar to the island of Sardinia. Some are raised on basements of masonry or platforms of earth. They are made of granite limestone, basalt, porphyry, sandstone, and schist. Their entrances



Plan and Elevation of the Nuraghe of Goni, in Sardinia.

are small and low; and when they have chambers of two stories, the upper chamber is reached by the spiral staircase, which has loopholes to admit the light. The

tops are supposed to have had a terrace. Although 3,000 of them remain in Sardinia, none are perfect. Their masonry is irregular, but not polygonal, and resembles the style of work called Asiatic. Like the round towers of Ireland, and other uninscribed monuments, their object and antiquity are unknown. They have been supposed to be the work of the Pelasgi, the Phœnicians, or the Carthaginians, and to have been ancient sepulchres, *Tholi* or *Dædalia*, constructed in heroic times. Skeletons, and paraphernalia belonging to graves or funerals, have been found in them. They have many points of resemblance to the 'Burghs' or 'Duns' on the n. shores of Scotland—e.g., the Burgh of Mousa, in Shetland.—De la Marmora, *Voyage en Sardaigne*, tom. ii.; Petit Radel, *Nuraghes* (Paris 1828); Dennis, *Cities and Cem. of Etruria*.

NUREDDIN': see NOUREDDIN-MAHMOUD.

NÜRNBERG, *nürn'bĕrċh*, or NUREMBERG, *nū'rėm-bėrg* (*Norimberga*, *Norica*): city of the Bavarian province of Middle Franconia; in a sandy but well-cultivated district on the Pegnitz river (ultimately joining the Main). N. is one of the most remarkable and interesting cities of Germany, on account of its numerous remains of mediæval architecture in its picturesque streets, with their gabled houses, stone balconies, and quaint carvings. No city retains a stronger impress of the characteristics which distinguished the wealthy burgher classes in the middle ages, while its double lines of fortified walls, separated from each other by public walks and gardens, and guarded by 70 towers, together with the numerous bridges which span the Pegnitz, on whose banks the city is built, give it distinctive features of its own. Among the most remarkable of its numerous public buildings are: the old palace or castle, commanding, from its high position, a glorious view of the surrounding country, and interesting for its antiquity, and for its gallery of paintings, rich in gems of early German art; the town-hall, which ranks among the noblest of its kind in Germany, and is adorned with works of Albert Dürer and Gabriel Weyer; the noble Gothic fountain opposite the cathedral, by Schonhofer, with its numerous groups of figures, beautifully restored in modern times; and many other fountains deserving notice. Of the numerous churches of N., the following are the most remarkable: St. Lawrence, built 1270–1478, with its beautiful painted-glass windows, its noble towers and doorway, the celebrated stone pyx, or ciborium, 65 ft. high, completed 1500, by Adam Krafft, after five years' assiduous labor, and the exquisite wood-carvings of Veit Stoss; St. Sebald's, with its numerous fine glass-paintings and frescoes by Peter Vischer and other German masters; the cathedral, or Our Lady's, built 1631, similarly enriched. N. is well provided with educational establishments, and, besides a good gymnasium and polytechnic institution, has schools of art, normal and other training col-

leges, a public library of 50,000 vols., galleries of art collections, museums, etc.; while the numerous institutions of benevolence are liberally endowed and well maintained. Although the glory of the foreign commerce of N. has long since passed away, its home trade is still of considerable importance, including the specialties of metal, wood and bone carvings, and children's toys and dolls, which find ready sale in every part of Europe, and are largely exported to America and the East. It is the seat also of a large transfer and exchange business, which owes much of its importance to the facilities of intercommunication afforded by the network of railway lines with which the city is connected.

N. was raised to the rank of a free imperial city by Emperor Frederick II., 1219, 21 years before which date Henry VI. is falsely said to have ennobled 38 of the burgher families, who forthwith arrogated supreme power over the N. territory. In the 13th c., we find it under the title of a burggraviate in the hands of the Hohenzollern family, who, 1417, ceded for a sum of money all their territorial and manorial rights to the magistracy of the city. This measure put a stop to the feuds which had raged between the burggrafs and the municipality; and for a time N. continued to grow rich with the fruits of the great internal trade, which it had long maintained between the traders of the East and the other European marts of commerce. The discovery of the passage by the Cape of Good Hope, by opening new channels of communication between Asia and Europe, deprived N. of its ancient monopoly. The Thirty Years' War completed the decay of the city, which suffered severely from both parties in turn. The ancient reputation of N. as a wealthy and loyal city of Germany secured to it, however, special consideration; and when the imperial commissioners reorganized some of the dismembered parts of the old empire, 1803, it was allowed to retain its independence, with a territory of 483 sq. m., containing 40,000 inhabitants, and drawing a revenue of 800,000 guldens; but in consequence of the disputes in which the free city became involved with the king of Prussia, who had some hereditary claim on the ancient burggraviate, N., alarmed at the prospect of still greater embarrassments, entered into the Rhenish confederation, and, as the result of this alliance, was transferred, 1806, with the surrender of its entire domain and all rights of sovereignty, to the king of Bavaria.—Pop., mostly Prot. (1881), 99,519; with suburbs 103677; (1890) 142,590; (1900) 261,081.

NURSE, n. *nėrs* [OF. *norrice* and *nurrice;* F. *nourrice,* a nurse; *nourrissant,* nursing—from L. *nutrīcem,* a nurse —from L. *nutrĭō,* I suckle or feed young] : a woman who has the care of infants or young children; a woman who suckles the infant of another—familiarly called a wet-nurse; one having the care of a sick person; he or that which cherishes or promotes; state of being nursed : V. to suckle; to nourish at the breast, as an infant; to attend and take care of in sickness; to cherish; to manage with care and economy. NURS'ING, imp. NURSED, pp. *nėrst.* NURS'ER, n. *-ėr,* one who nurses. NURSERY, n. *nėrs'ėr-ĭ,* the apartment in a house set apart for the young children : ground for the rearing of plants (see below); the place where anything is fostered and promoted. NURSERYMAN, n. one who rears plants in ground set apart for the purpose. NURS'LING, n. *-lĭng,* an infant; a foundling. NURSERY TALES, fairy-stories and small books of fiction that form the old and popular literature of childhood.

NURSE, MILITARY : trained attendant on soldiers in hospitals. In armies of continental Europe, the 'sisters of charity' usually carry their mission of mercy into the military hospitals. In Prot. countries, in part, the soldiers have been dependent on the regular male hospital attendants for their care during sickness, or when suffering from wounds. The Crimean campaign, however, disclosed so melancholy a picture of the want of women's co-operation, that a band of self-sacrificing ladies, headed by Miss Nightingale (q.v.), proceeded to Turkey, and were soon acknowledged as messengers of health and life by the unfortunate wounded. The example thus set has not been without effect. In the Franco-German war of 1870–1, also in the Russo-Turkish war of 1877–8, lady-nurses of various nations ministered in all the military hospitals.—See NURSES, TRAINING OF.

NURS'ERY : place in which fruit-trees and shrubs are propagated for transplanting. The soil should be dry or thoroughly drained, in a good state of fertility, and deeply plowed, and the subsoil loosened, but not brought to the surface. Plants are procured from layers, cuttings, or seeds. The quince, grape, and gooseberry, and Doucin and Paradise apples, are readily propagated by layers. The wood of the preceding year's growth can be used in spring, or that of the current year in July or Aug. The branch to be layered is cut partly through the wood, near the base of a bud, and split 2 or 3 in. toward the end of the shoot. The ground having been pulverized, the branch, with the cut spread, is placed thereon, fastened down, and covered with 3 in. of earth. Long vines may be treated at several different points. A more rapid method with the quince, and the Doucin and Paradise apples, is cutting off the stock near the ground in spring, covering it with earth in the autumn, and the next autumn removing the numerous shoots which have appeared. A cutting is a portion of a shoot.

It should be taken from well-matured wood of the current season's growth, 2 to 12 in. in length, and be cut close to a bud at each end. Cuttings from a point near the old wood are better than those from the tips of shoots. They are made in autumn, kept in earth during winter, and planted very early in the spring. They are set 3 to 12 in. apart in trenches, with one bud above-ground in case of the grape, and 2 buds with other plants, and the earth firmly packed around their bases. Apple, pear, and stone-fruit trees are grown principally from seeds. Those of the apple are obtained from a cider-mill or from decayed fruit. They are cleaned, and the light seeds removed by washing. The seeds are dried, placed in boxes with slightly moist sand, and planted in rows 3 ft. apart as soon as the ground is dry in spring. Pear-seeds may be obtained from decayed fruit, but are largely imported from Europe, as the plants thus obtained are considered more hardy than those from American seed. Cherry, plum, and peach seeds are obtained from ripened fruit, freed from the pulp, washed, and packed in boxes with layers of sand. Peach-stones are sometimes cracked, and the seeds sprouted before planting. When one year old, plants which have been started in the nursery are to be taken up, the roots packed closely in dry soil, and the tops covered so as to protect from frost. Before they are set in spring, the roots should be trimmed and the tops shortened. Rows should be 3 ft. apart, and plants from 1 to 3 ft. in the row, according to the variety and the length of time that they are to remain. The apple plants are usually root-grafted in winter; but other species of trees grown in the nursery are budded usually the first or second summer after transplanting. The currant is readily propagated by cuttings; the red raspberry and blackberry by shoots called suckers—but better plants are obtained from root-cuttings; and the blackcap raspberry by covering the tips of the plants in the ground. The land must be frequently cultivated and kept free from weeds, and the trees will need careful pruning and close attention as long as they remain in the nursery.

NURS'ES, Training of: one of the great humanitarian movements of modern times. In France, members of Rom. Cath. sisterhoods have been noted for hospital service; and in Germany the Institute of Deaconesses gave instruction to those who wished to become nurses, and in 1836 sent out Florence Nightingale (q.v.) from her English home to her noble work for humanity. Soon after the close of the Crimean war, schools for training nurses were established in England and Russia, and have since been founded in other countries. The first movement of the kind in the United States is supposed to have been made by Dr. Valentine Seaman, of the New York Hospital, who delivered a course of 26 lectures on subjects pertaining to nursing, which were published in book form 1800. A 'Nurse Society' was formed 1838 by Friends in Philadelphia. The Rom. Cath. sisterhoods

were active, the Lutheran churches followed, and on the foundation of St. Luke's Hospital, New York, 1853, the Prot. Episc. denomination took up the work, which has been followed by other branches of the church and by institutions outside of sectarian, or even religious, lines. The first training schools for nurses in this country were established in 1873, one each being organized that year in New York, New Haven, and Boston. Since that time nearly every year has seen the foundation of new schools, until now there are about 60 large training schools for nurses in the United States. New York has a large number, and many of the large cities in various parts of the country are represented by one or more of these schools in connection with their hospital service. Details vary somewhat in different schools, but in general the intending pupils must be between the ages of 21 and 35 years, of good character, sound health, and at least fair mental capacity and attainments. They are taken on a probation of two months, during which period they furnish their own clothes, but are boarded at the expense of the institution. Those who appear competent, and who desire to remain, contract to serve for two years, and to abide by the rules of the school and hospital. In addition to board and lodging, and care during sickness, a small monthly salary is paid. With the exception of an hour at noon for dinner, and time for exercise and rest, their hours of duty are from 8 A.M. to 8 P.M. They are on duty but half the day Sunday, have one free afternoon each week, and are allowed a vacation of two weeks during the year. The course includes lectures on a large number of practical topics, such as respiration, temperature, circulation of the blood, fevers, bacteriology, and invalid dietary. The pupils are taught also the most approved methods of heating, ventilating, and disinfecting rooms; are shown when and how to use friction, how to make and apply poultices and bandages, to dress wounds and treat accidental injuries, to care for helpless patients; and are taught the various ways of promoting the comfort and facilitating the recovery of the sick. The pupils are trained to observe carefully and to record accurately the condition of the patient, and in various other ways to render aid to the physician. The lectures and teaching are given by the hospital physicians, surgeons, and other officers; the responsibilities of the position are clearly set forth, together with the confidential relation which must exist between the nurse and the employer; and the pupils are urged to adopt a strict professional code. There are regular recitations and reviews, and, at the end of the two years, diplomas are given to all who satisfactorily pass the final examinations. In cases of severe sickness, the well-trained and faithful nurse is recognized as not only bringing great relief from the strain on kindred and friends, but as greatly supplementing the physician's efforts for the patient's recovery.

NURTURE, n. *nėr′tūr* or *-chûr* [OF. *noriture;* F. *nourriture*, food—from L. *nutrītūra*, about to nourish—from L. *nutrĭō*, I suckle or feed young] : that which nourishes; anything which promotes growth; food; diet; education; instruction: V. to feed; to educate; to train up. NUR′TURING, imp. NURTURED, pp. *nėr′tūrd* or *-chûrd.*—SYN. of 'nurture, v.': to cherish; nourish; nurse; tend; bring up.

NUSAIRIEH: see NOSSAIRIANS.

NUT, n. *nŭt* [AS. *hnut;* Dut. *noot;* Icel. *hnot;* Ger. *nuss;* Gael. *cnudh;* L. *nux*, a nut] : a fruit consisting of a kernel inclosed in a hard shell; in *bot.*, a bony pericarp containing a single seed, to which it is not closely attached (see below): a piece of metal grooved for screwing on to the end of a bolt: V. to gather nuts. NUT′TING, imp.: ADJ. pert. to gathering nuts: N. act of gathering nuts. NUT′TED, a. supplied with a nut. NUT′TY, a. *-tĭ*, abounding in nuts; resembling a nut in flavor, as wine. NUT-BROWN, of the color of a nut. NUT-CRACKER, instrument for breaking nuts: a bird (see below). NUT-GALL, the acorn or nut of the oak (see GALL, or GALL-NUT). NUT-HATCH, NUT-PECKER, birds (see NUT-HATCH, below). NUT′SHELL, hard substance inclosing the kernel of the nut: anything of little value or of small compass. NUT-HOOK, in *OE.*, hooked stick for pulling down boughs with nuts on them: an officer of justice; a bailiff. NUT TO CRACK, a puzzle to be found out; a problem to be solved.

NUT: in popular language, any fruit which has the seed inclosed in a bony, woody, or leathery pericarp, not opening when ripe. Among the best-known nuts are the Hazel-nut, Brazil-nut, Walnut, Chestnut, and Cocoa-nut, all edible. Other nuts are used in medicine and in the arts. Some of the edible nuts abound in a bland oil, used for various purposes.—In botany, the term nut (*nux*) designates a one-celled fruit, with a hardened pericarp, containing, when mature, only one seed. The *Achene* (q.v.) was by the older botanists generally included in this term. The hazel-nut is an excellent example of the true nut of botanists.—The name nut, without distinctive prefix, is popularly given in Britain to the hazel-nut, but in many parts of Europe to the walnut; in some parts of the United States to the walnut, in others to the chestnut; etc.

Many nuts have considerable commercial value, as favorite articles of food: these are the Hazel-nut and its varieties, the Black Spanish, the Barcelona, the Smyrna, the Jerusalem filbert, and the common filbert; the Walnut, Chestnut, Hickory, and Pecan; the Souari, the Cocoa or Coker nut, and the Brazil or Para nut. Hazel-nuts are exported from the shores of the Black Sea; chestnuts from Leghorn, Naples, Spain, France, and Portugal; Brazil-nuts from Para and Maranham. The value of all nuts imported into Great Britain for use as fruit, 1880, was stated at about $2,500,000.

NUTANT, a. *nū'tănt* [L. *nutans* or *nutan'tem*, nodding or wagging the head; *nutatĭōnem*, a nodding]: nodding; having the top bent downward. NUTA'TION, n. *-tā'shŭn* [F.—L.]: a vibratory movement of the earth's axis, by which the pole describes a small ellipse every 19 years (see below): a constant and involuntary movement of the head in one or more directions; in *bot.*, the curvature in an organ of a plant, produced by the unequal growth of different sides.

NUTA'TION, in Astronomy: slight oscillatory movement of the earth's axis, which disturbs the otherwise circular path described by the pole of the earth round that of the ecliptic, known as the 'precession of the equinoxes.' It is produced by the same causes—viz., attraction by the sun, moon, and planets (the attraction of the last mentioned being so small as to be quite imperceptible) on the bulging zone about the earth's equator, though in this case it is the moon alone that is the effective agent. It also, for reasons which need not be given here, depends, for the most part, not on the position of the moon in her orbit, but of the moon's node. If there were no precession of the equinoxes, N. would appear as a small elliptical motion of the earth's axis, performed in the same time as the moon's nodes take to complete a revolution, the axes of the ellipse being respectively 18''·5 and 13''·7, the longer axis being directed toward

the pole of the ecliptic. But this motion, when combined with the more rapid one of precession, causes the pole of the earth's axis to describe a wavy line round P, the pole of the ecliptic.

The effect of N., when referred to the equator and ecliptic, is to produce a periodical change in the obliquity of the ecliptic, and in the velocity of retrogradation of the equinoctial points. It thus gives rise to the distinction of 'apparent' from 'mean' right ascension and declination, the former involving, and the latter being freed from, the fluctuations arising from N. This motion is common to all the planets.

NUT-CRACKER (*Nucifraga* or *Caryocatactes*): genus of birds of family *Corvidæ*, with a straight conical bill, both mandibles terminating in an obtuse point, and tail nearly square at the end. The form and characters are nearly similar to those of crows, but the habits are rather those of jays, and were formerly thought to indicate an approach to woodpeckers. One species (*N. caryocatactes*

Nut-cracker (*Nucifraga caryocatactes*).

or *C. nucifraga*) is occasionally seen in Britain, and is not uncommon in many parts of Europe and Asia, particularly in mountainous regions covered with pines. It is about the size of a jackdaw, but has a longer tail. The plumage is light brown, speckled with white, except on the wings, rump, and tail, which are nearly black. The N. frequents the tops of high pines, and is a shy bird. Its bill can be used with much force and ingenuity, but it is not known to have the power of cracking nuts.

NUT-HATCH (*Sitta*): genus of birds of family *Certhiadæ*, or, according to some writers, *Paridæ*, having a straight conical or prismatic bill, short legs, the hind toe very strong. They run up and down trees with great agility, moving with equal ease in either direction, and without hopping, so that the motion is rather that of a mouse than of a bird. They feed on insects, in pursuit of which they examine the crevices and remove the scales of the bark; also on seeds, as those of pines, and the kernels of nuts, to obtain which they fasten the nut firmly in some crevice of bark or other such situation, and peck at it until the shell is broken, so placing themselves that they sway not merely the head, but the whole body, to give force to the stroke. The English name is said to have been originally *Nut-hack*. One species, the EUROPEAN N. (*S. Europæa*), is common in most parts of Europe, and is found in most of the wooded districts of England. Its whole length is about six inches. If taken young, it is easily tamed, and becomes very familiar and amusing; but an old bird caught and put into a cage is apt to kill itself by violently pecking

to force a way out. It soon destroys the wood of a cage.—Other species are found in the East; and in N. America the genus is particularly abundant, *S. canadensis* being the red-bellied N.; *S. carolinensis* the white-bellied, with the slender-billed var. w.; *S. pusilla* the brown-headed of the s.; and *S. pygmæa* far west.

European Nut-hatch (*Sitta Europæa*).

NUTMEG, n. *nŭt′mĕg* [OF. *noix muguette;* late L. *nux moschātă*, nutmeg—from OF. *muge*, musk: L. *muscus;* Gr. *moschos*, musk, the musk being taken as the type of anything highly scented]: aromatic kernel—consisting mostly of the albumen—of the fruit of several species of *Myristica*. This genus belongs to a nat. order of exogens, *Myristicaceæ*, which contains about 40 species, all tropical trees or shrubs, natives of Asia, Madagascar, and America. They generally have red juice, or a juice which becomes red on exposure to air. The order is allied to *Lauraceæ*. The leaves are alternate and without stipules. The flowers are unisexual, the perianth generally trifid, the filaments united into a column. The fruit is succulent, yet opens, like a capsule, by two valves. The seed is nut-like, covered with a laciniated fleshy aril, and has an albumen penetrated by its membranous covering. The species of this order are generally more or less aromatic in all their parts; their juice is styptic and somewhat acrid; the albumen and aril contain both a fixed and an essential oil, and those of some species are used as spices. The genus *Myristica* has the anthers united in a cylindrical column, and the cotyledons folded. The species which furnishes the greater part of the nutmegs of commerce is *M. fragrans* or *moschata;* but the long N. (*M. fatua*), from the Banda Isles, is now frequent in western markets. The common N.-tree is about 25 ft. in height, with oblong leaves and axillary few-flowered racemes; the fruit is of the size and appearance of a roundish pear, golden yellow in color when ripe. The fleshy part of the fruit is rather

hard, and is of peculiar consistence, resembling candied fruit; it is often preserved and eaten as a sweetmeat. Within is the nut, enveloped in the curious yellowish-red aril, the *Mace* (q.v.), under which is a thin, shining brown shell, slightly grooved by the pressure of the mace, and within is the kernel or nutmeg. Up to 1796, the Dutch, being the possessors of the Banda Isles, jealously prevented the N. from being carried in a living state to any other place; but during the conquest and retention of the islands by the British, care was taken to spread the culture of this valuable spice, and plants were sent to Penang, India, and other places, where they are now successfully cultivated; indeed, they have now become established in the W. India Islands, and both Jamaica and Trinidad produce excellent nutmegs. Brazil also is found favorable to their culture. The N. is very liable to the destructive attack of a beetle, and it is a common practice to protect the nuts with a coating of lime before shipping them for export. The Dutch or Batavian nutmegs are nearly always limed; but those from Penang are not, and are consequently of a greater value. The N. yields, by expression, a peculiar yellow fat, called oil of mace, because, from its color and flavor, it was generally supposed to be derived from mace; and by distillation is obtained an almost colorless essential oil, which has very fully the flavor of the nutmeg. Her own settlements now furnish Great Britain with the greater portion of this spice, but some lots of Batavian also come into the market. The quantity imported may be stated as 300,000 pounds weight, worth, in round numbers, $350,000.

Nutmegs are used chiefly as a spice, but medicinally they are stimulant and carminative. They possess narcotic properties, and in large doses produce stupefaction and delirium, so that they ought not to be used where affections of the brain exist or are apprehended.

Other species of *Myristica*, besides those above named, yield nutmegs sometimes used, but of very inferior quality.—The fruits of several species of *Lauraceæ* also resemble nutmegs in aromatic and other properties—e.g., the cotyledons of *Nectandra Puchury*, the Pichurim Beans of commerce, and the fruit of *Acrodiclidium camara*, a tree of Guiana, the Camara or Ackawai nutmeg. The clove nutmegs of Madagascar are the fruit of *Agathophyllum aromaticum*, and the Brazilian nutmegs of *Cryptocarya moschata*. All these belong to the order *Lauraceæ*. The Calabash N. is the fruit of *Monodora myristica*, of the natural order *Anonaceæ*. NUT'MEGGED, a. *-mĕgd*, seasoned with nutmeg. NUT'MEGGY, a. *-mĕg-gĭ*, having the character of a nutmeg.

NUTRIA, n. *nū'trĭ-ă* [Sp. *nutria*, an otter]: the commercial name given to the skin or fur of the coypu, a rodent quadruped about the size and shape of the beaver: see COYPU: RACOONDA.

NUTRIENT, a. *nū'trĭ-ĕnt* [L. *nutrĭens* or *nutrĭen'tem*, nourishing—from *nutriō*, I nurse or nourish]: nourishing; nutritious: N. anything nourishing or nutritious. NUTRIENT RATIO, a number expressing the comparative value of feeding-stuffs for cattle, meadow-hay being reckoned 1. NU'TRIMENT, n. *-mĕnt* [L. *nutrimen'tum*, nourishment]: food; that which nourishes. NU'TRIMEN'TAL, a. *mĕn'tal*, nutritious; having the quality of food. NUTRITIOUS, a. *nū-trĭsh'ŭs* [L. *nutrītĭŭs*, that nourishes]: having the quality of nourishing; promoting the growth or repairing the waste of animal bodies. NUTRI'TIOUSLY, ad. *-lĭ*. NUTRITION, n. *nū-trĭsh'ŭn* [F.—L.]: that which nourishes; the act or process of promoting growth or repairing waste in animal or vegetable bodies (see below). NUTRITIVE, a. *nū'trĭ-tĭv* [F. *nutritif*]: having the quality of nourishing. NU'TRITIVELY, ad. *-lĭ*.

NUTRITION: The science of nutrition had its beginning in the remarkable work of Lavoissier in the latter part of the 18th century. He established the facts that the quantity of oxygen absorbed, and of carbon dioxid excreted depend primarily on food, work, and temperature. Many other chemists, but especially the German chemist, Liebig, added greatly to our knowledge of this science.

The chemical changes of materials in the body, under the influence of living cells, is known as metabolism, and after the development of organic chemistry it was left for Carl v. Voit to establish the fact that the nitrogen of the proteids eaten was equal to the nitrogen eliminated from the body in the feces and urine. Another important fact is that if proteid nitrogen be retained in the body a new construction of body tissue is indicated, but if more nitrogen is eliminated than is ingested in the food there must be a waste of body tissue.

Voit suggested to Pettenkofer the construction of an apparatus with which the total carbon excretion, including that of the respiration, as well as that of the urine and feces, might be measured. Bischoff and Voit had previously reached the conclusion that the waste of the body in starvation is dependent on the metabolism of proteid and fat. The respiration apparatus of Pettenkofer as noted above, was needed to give correct results, and thus ascertain the quantity of nitrogen and carbon in the urine and the feces, and the amount of carbon-dioxid of respiration during the same time.

According to Voit muscle work did not increase proteid metabolism and metabolism was not proportional to oxygen supply. Although fat burned very readily in the air, it burned only with great difficulty in the body. On the other hand, although burning with difficulty in the air, it goes to pieces very readily in the body.

From the experiments of Lassen, Pflüger, and others it is evident that respiration does not cause or regulate metabolism. On the contrary, the metabolism regulates

respiration. 'The metabolism of the tissues through its oxygen requirement and its carbon dioxid production, changes the condition of the blood, and thereby regulates respiration.'

Lusk says: 'The first cause of their chemical change is unknown, but their results lead to motions of the smallest particles of protoplasm, motions whose totality we call life. Phenomena of life are phenomena of motion, due to liberation of energy in the breaking down of molecules. The motions are principally manifested as heat, mechanical energy and electric currents. In the organism mechanical energy may be converted into heat, as appears when the work of the heart is converted into heat by the friction of the blood upon the capillaries. Also the current of electricity developed at each systole of the heart, or in any other active tissue, is resolved into heat. Thus heat may become a measure of the total activity of the body. It is derived from the total metabolism and must be dependent on it and be a measure of it. Hence the physical activities noted in life are the results of chemical decompositions. Metabolism vivifies the energy potential in chemical compounds.'

After the law of conservation of energy was laid down by Mayer, and it was known that the sum total of energy in the universe remains constant—but that the energy may vary in kind, it was obvious that this law was applicable to the changes that take place in the body.

Energy is stored up in the plant under the influence of sunlight. Plants furnish the basis of animal food, as they produce substance like starch and sugar, which can build up animal tissue, and 'can furnish the energy necessary to maintain these motions in the cells whose aggregate is called life.'

Considerable important work was done by Stokmann and others on the calorific value of foods. It was shown by Rubner that the heat value to the body of burning starch and fat was the same as that in the calorimeter. The latter is an instrument used to determine the heat produced by the combustion of fuel.

The heat value of a proteid, however, in the calorimeter is different from its fuel value in the body. The heat value of the urinary constituents must be subtracted from the heat value of the proteid to determine the fuel value of the proteid to the body.

Atwater and Bryant announced the following standard values which may be used in the determination of this fuel value of a mixed diet:

1 gram proteid	4	calories.
1 gram fat	8.9	"
1 gram carbohydrate	4	"

One of the latest appliances for the study of these problems is the calorimeter constructed by Atwater and Rosa. This was so large that a man could live, work, study, and sleep in it, and its use confirmed Rubner's experiments that the energy expended by a man in doing any work is exactly equal to the energy set free by

metabolism in the body. It is by a study of the conditions of living in an apparatus such as this that the general laws of metabolism in the body are established, and only through a knowledge of these laws can the proper system of nutrition for people in various circumstances be devised.

If we consider nutrition from another standpoint, we know that the blood carried by the capillaries to the several tissues of the body is the source whence all the organs derive their materials of growth and development; and it is found that there is direct proportion between the vascularity of any part and the activity of the nutrient operations which take place in it. Thus, in nervous tissue and muscle, in mucous membrane and in skin, a rapid decay and renovation of tissue are constantly going on, and these are parts in which the capillaries are most abundant; while in cartilage and bone, tendon and ligament, the disintegration of tissue is comparatively slow and the capillaries are much less abundant. Each elementary cell or particle of a tissue seems to have a sort of gland-like power not only of attracting materials from the blood, but of causing them to assume its structure and participate in its properties.

Nutrition is the process by which the various parts are maintained in the same general conditions of form, size, and composition, which they have already by development and growth attained. It is by this process that an adult person in health maintains for a considerable number of years the same general outline of features, and nearly the same size and weight, though during all this time the several tissues of his body are undergoing perpetual decay and renovation.

It may be regarded as an established fact in physiology that every particle of the body is formed for a certain period of existence in the ordinary conditions of active life, at the end of which period, if not previously destroyed by excessive exercise, it is absorbed or dies, and is cast off. (The hair and the deciduous or milk teeth afford good illustrations of this law.) The less a part is exercised the longer its component particles appear to live. Thus, Mr. Paget found that, if the general development of the tadpole be retarded by keeping it in a cold, dark place, and if thereby the functions of the blood corpuscles be slowly and imperfectly discharged, the animal will retain its embryonic state for several weeks longer than usual, and the development of the second set of corpuscles will be proportionately postponed, while the individual life of the corpuscles of the first set will be, by the same time, prolonged.

For due performance of the function of nutrition certain conditions are necessary, of which the most important are—1, a right state and composition of the blood, from which the materials of nutrition are derived; 2, a regular and not distant supply of such blood; 3, a certain influence of the nervous system; and 4, a natural state of the part to be nourished.

1. There must be, peculiar to each individual, a certain adaptation between the blood and the tissues. Such an adaptation is determined in its first formation, and is maintained in the concurrent development and increase of both blood and tissues. This maintenance of the sameness of the blood is well illustrated by the action of vaccine matter. By the insertion of the most minute portion of the virus into the system, the blood undergoes an alteration which, although it must be inconceivably slight, is maintained for several years; for, even very long after a successful vaccination, a second insertion of the virus may have no effect, because the new blood formed after the vaccination continues to be made similar to the blood as altered by the vaccine matter. So, in all probability, are maintained the morbid states of the blood which exist in syphilis and many other chronic diseases, the blood, once inoculated, retaining for years the taint which it once received. The power of assimilation which the blood exercises in these cases is exactly comparable with that of maintenance by nutrition in the tissues; and evidence of the adaptation between the blood and the tissues, and of the delicacy of the adjustment by which it is maintained, is afforded by the phenomena of symmetrical diseases (especially of the skin and bones), in which, in consequence of some morbid condition of the blood, a change of structure affects in an exactly similar way the precisely corresponding parts on the two sides of the body, and no other parts of even the same tissue.

2. The necessity of an adequate supply of appropriate blood in or near the part to be nourished is shown in the frequent examples of atrophy of parts to which too little blood is sent, of mortificati when the supply of blood is entirely cut off, and of defective nutrition when the blood is stagnant in a part.

3. Numerous cases might be readily adduced to prove that a certain influence of the nervous system is essential to healthy nutrition. Injuries of the spinal cord are frequently followed by mortification of portions of the paralyzed parts; and both exp. and clinical cases show that the repair of injuries takes place less completely in parts paralyzed by lesion of the spinal cord than in ordinary cases.

4. The fourth condition is perfectly obvious. Consult Foster's *Text Book of Physiology; Metabolism of Nitrogen and Carbon in the Human Organism* (U. S. Dep't Agric. Ex. Sta. Bul. 63, also Ex. Sta. Bul. 69); Hutchison, *Food and Dietetics;* Chittenden, *Physiological Economy in Nutrition;* and works on physiology by Huxley. See DIGESTION; CIRCULATION; SECRETION; LYMPH; LYMPHATICS; DIET; FOOD AND DRINK.

NUTT, *nŭt*, ALFRED TRUBNER: English folk-lore scholar: b. London 1856, Nov. 22. His education was obtained at University College School and the Collège de Vitry François, and after serving from 1874 a three-years' apprenticeship in the book publishing business on

the Continent, succeeded to that of his father, David Nutt, in London, in 1877. He joined the Folk Lore Society soon after and was elected its president in 1897. He founded the English Goethe Society in 1886 and was one of the founders of the Irish Texts Societies in 1898. He has written *The Legend of the Holy Grail with Especial Reference to the Hypothesis of its Celtic Origin* (1888); *The Voyage of Bran* (1895-7).

NUTTALL, *nŭt'al*, THOMAS: 1786-1859, Sep. 10; b. Settle, Yorkshire, England. He learned printing in England, but, coming to the United States at the age of 22, took up the study of natural history, and occupied the remainder of his life in scientific pursuits. He was interested especially in botany and ornithology, and his investigations covered a wide field. He traveled through nearly every state in the Union, explored rivers and the great lakes, and from the Pacific coast sailed to the Sandwich Islands. 1822-28 he was curator of the botanical gardens and lecturer on natural history in Harvard Univ. It is believed that no other student of the botany of North America has made more discoveries, and that no writer on American plants, except Prof. Asa Gray, has described more new genera and species. He returned to England 1842, having inherited an estate the previous year. He died in St. Helen's, Lancashire.

NUX VOMICA, n. *nŭks' vŏm'ĭ-kă* [L. *nux*, all fruits that have a hard shell; *vomicus*, pertaining to vomiting —from *vomĕrĕ*, to vomit]: the vomit nut; the fruit of the East Indian Strychnos, yielding the now well-known deadly poison strychnia, ord. *Loganiāceæ:* a medicinal preparation made from it. The following are the characters of these seeds, which are imported from the E. Indies: 'Nearly circular and flat, about an inch in diameter, umbilicated and slightly convex on one side, externally of an ash-gray color, thickly covered with short satiny hairs, internally translucent, tough and horny, taste intensely bitter, inodorous.'

For the genuine characters, see the article STRYCHNOS.

The Nux Vomica tree is a native of Coromandel, Ceylon, and other parts of the E. Indies. It is of moderate size, with roundish-oblong, stalked, smooth leaves, and terminal corymbs. The fruit is a globular berry, about as large as a small orange, one-celled, with brittle shell, and several seeds lodged in a white gelatinous pulp.— The bark is known as *False Angostura Bark*, having been confounded with Angostura Bark, through a commercial fraud, about the beginning of the 19th century; but its properties are very different, as it is very poisonous.

The seeds contain (in addition to inert matters, such as gum, starch, woody fibre, etc.) three alkaloids closely related to each other, which act as powerful poisons on the animal frame, and speedily occasion violent tetanic convulsions and death. These alkaloids or bases are named *Strychnia, Brueia*, and *Igasuria*, and exist in the seeds in combination with lactic and strychnic (or igasuric) acid. For a good method of obtaining pure strychnia,

which is by far the most important of the three bases, see *The British Pharmacopœia*, p. 328.

Strychnia ($C_{21}H_{22}N_2O_2$) occurs 'in right square octahedrons or prisms, colorless and inodorous, scarcely soluble in water, but easily soluble in boiling rectified spirit, in ether, and in chloroform. Pure sulphuric acid forms with it a colorless solution, which, on the addition of bichromate of potash, acquires an intensely violet hue, speedily passing through red to yellow.'—*Op. cit.* In nitric acid, it ought, if pure, to form a colorless solution; if the solution is reddish, it is a sign that brucia also is present. Strychnia combines with numerous acids, and forms well-marked salts amenable to the same tests as the base itself.

Brucia ($C_{23}H_{26}N_2O_4$) is insoluble in ether, but more soluble in water and in strong alcohol than strychnia; and it is the most abundant of the three alkaloids in nux vomica. It acts on the animal economy similarly to, but much less actively than strychnia, from which it may be distinguished not only by its different solubility, but by the red color which is imparted to it by nitric acid, and which changes to a fine violet on the addition of protochloride of tin. Like strychnia, it forms numerous salts.

Igasuria seems closely to resemble brucia in most respects. Little is known regarding *Igasuric Acid*.

Strychnia, brucia, and igasuria occur not only in nux vomica but in the seeds of *Strychnos ignatii* (St. Ignatius's beans), and in the seeds and other parts of several plants of the genus *Strychnos*. The amount of strychnia present in these substances varies from 0·5 to 1·5 per cent.

N. V., according to the experiments of Marcet, acts on vegetables as a poison. His experiments were, however, confined to the haricot bean and the lilac. It is poisonous in a greater or lesser degree to most animals, though larger quantities are required to kill herbivorous than carnivorous animals. Thus, a few grains will kill a dog, but some ounces are required to kill a horse. It is believed, however, that the bird called *Buceros Rhinoceros* eats the nuts with impunity; and a peculiar kind of *Acarus* lives and thrives in the extract of the nuts. Dr. Pereira describes three degrees of the operation of this substance on man. 1. In very small doses, its effects are tonic and diuretic, and often slightly aperient. 2. In larger doses, there is a disordered state of the muscular system; the limbs tremble; a slight rigidity or stiffness is felt when an attempt is made to put the muscles in action; and the patient experiences a difficulty in keeping the erect posture. If the use of the medicine be continued, these effects increase in intensity, and the voluntary muscles are thrown into a convulsed state by very slight causes, as, for example, by inspiring more deeply than usual, or even by turning in bed. It is remarkable that in paralysis the effects are most marked in the paralyzed parts. 3. In poisonous doses, the symptoms are tetanus and asphyxia, followed by death. It is difficult to say what is the smallest dose that would prove fatal to an adult: 30 grains of the powdered nuts, given by mistake

to a patient, have destroyed life; and three grains of the extract have proved fatal.

The preparations of N. V. are the powdered nuts, the extracts, the tincture, and strychnia; the alkaloid being usually preferable, because of its more constant strength. In various forms of paralysis, especially where there is no apparent lesion of structure, N. V. is a most successful remedy; though there are cases in which it is positively injurious. It is of service also in various affections of the stomach, such as dyspepsia, gastrodynia, and pyrosis. The average dose of the powder is two or three grains, gradually increased; that of the tincture, 10 or 15 minims; and that of the extract, half a grain, gradually increased to two or three grains; but this dangerous substance should never be used except under professional advice. See A. S. Taylor's *Principles and Practice of Medical Jurisprudence* (3d ed., Lond. 1883).

NUZZLE, v. *nŭz'l* [from Nozzle, which see: Low Ger. *nusseln*, to nose often]: to work with the nose, as a swine, in the earth; to use the nose often; to go with the nose down like a swine; in *OE.*, to nurse; to foster; to nestle. Nuz'zling, imp. *-lĭng*. Nuzzled, pp. *nŭz'ld*.

NYACK, *nī'ăk:* village in Rockland co., N. Y.; on the New York Lake Erie and Western railroad, and the Hudson river; 29 m. from New York, with which it is also connected by a line of steamers; and opposite Tarrytown, to which there is a steam ferry. N. is the seat of N. Military Acad., Hudson River Military Acad., and Rockland Military Acad., has good public schools, libraries, and churches. The streets are macadamized, and lighted by electricity; water from mountain springs is distributed from reservoirs; and there is an organized fire department. There are large shoe-shops, and hat and various other manufactures. Pop. (1870) 3,438; (1880) 3,881; (1890) 4,111; (1900) 4,275.

NYAM-NYAM, *n'yăm-n'yăm:* widespread and well-marked race in central Africa, occupying an area in the basins of the Upper Nile, Congo, and Shari. They have the Monbuttus for neighbors in the e., among the headwaters of the Welle, and w. they border the Fan country. There are three or more branches of N., slightly differing in appearance, language, and degree of barbarism. But they are readily distinguished by their common characters from any other race. They are probably in the main of negro stock, with some alien mixture, physique and language being fundamentally negroid. One outstanding characteristic of the N. is their pronounced cannibalism in its worst forms; and they are very fierce and savage generally. Yet they are quite intelligent, and skilful in some branches of industry. The men are frank, brave, and attached and faithful to their wives to a degree unknown among any other negro people. Most of our knowledge of them we owe to Schweinfurth, who visited their country 1870.

NYANGWE, *nyăng'wĕ:* town on the Upper Congo or Lualaba, at the edge of the Manyuema country, some distance below the Lukuga outlet of Lake Tanganyika. N. was the point from which Stanley commenced the descent of the Lualaba 1876.

N'YAN'ZA, ALBERT: see ALBERT N'YANZA.

N'YAN'ZA, VICTORIA: see VICTORIA N'YANZA.

NYASSA, *nyăs'sâ* or *nē-âs'sâ*, or NYANJA, *nyăn'jâ* or *nē-ăn'jâ* (apparently the same name as N'yanza): great lake in the interior of Africa; belonging to the Zambesi river system. Dr. Livingstone discovered it 1859 by ascending the river Shiré (q.v.), which conveys the waters of the lake to the Zambesi river at a point near its mouth. The lake is 1,500 ft. above sea-level, 350 m. long, 20 to 60 m. broad, and in most parts very deep—in some places over 100 fathoms. Its waters abound with fish. None of the rivers flowing into it are navigable. The country around N. is mountainous, though much of its immediate shore is low and marshy. For 100 m. the n.e. shore is bounded by the escarped edge of a plateau 7,000 to 10,000 ft. high, down which dash numberless waterfalls. The population of its shores, once dense, has been sorely scourged by the slave-trade. Of several mission settlements at or near N., the best known is the Scottish one at Livingstonia, whose founder, Mr. E. D. Young, R.N., in 1876 circumnavigated the lake in a steamer, brought in sections up the Shiré river. The Scottish Lakes Company have done much to promote legitimate trade here. Something had previously been known about this lake under the name of the Maravi. See E. D. Young's *N., a Journal of Adventures* (Lond. 1877). See ZAMBESI RIVER AND REGION.

NYÂYA, *nyá'ya* [from Skr. *ni*, into; *âya*, going, a derivative from *i*, to go; hence literally 'entering,' and figuratively, 'investigating analytically']: name of the second of the three great systems of ancient Hindu philosophy; apparently so called because it treats analytically of the objects of human knowledge, both material and spiritual, distributed by it under different heads or topics; unlike, therefore, the *Vedânta* (q.v.) and *Sânkhya* (q.v.), which follow a synthetic method of reasoning, the former of these systems being concerned chiefly in spiritual and divine matters, and the latter in subjects relating to the material world and man. The Nyâya consists, like the other two great systems of Hindu philosophy (see MÎMÂNSÂ and SÂNKHYA), of two divisions. The former, called NYÂYA (proper), is exclusively considered in this article; the other is known as VAIS'ESHIKA (q.v.). With the other systems of philosophy, the N. concurs in promising beatitude, that is, final deliverance of the soul from re-birth or transmigration, to those who acquire truth—which, in the case of the Nyâya, means thorough knowledge of the principles taught by this particular system.

The topics treated of by the N. are briefly the following: 1. The *pramân'a*, or instruments of right notion. They are: *a.* Knowledge which has arisen from the contact of a sense with its object; *b.* Inference of three sorts (*a priori*, *a posteriori*, and from analogy); *c.* Comparison; and *d.* Knowledge, verbally communicated, which may be knowledge of 'that whereof the matter is seen,' and knowledge of 'that whereof the matter is unseen' (revelation). 2. The objects or matters about which the inquiry is concerned (*prameya*). They are: *a.* The *Soul* (*âtman*); the site of knowledge or sentiment, different for each individual coexistent person, infinite, eternal, etc. Souls are therefore numerous, but the supreme soul is one; it is demonstrated as the creator of all things. *b. Body* (*s'arîra*); the site of action, of the organs of sensation, and of the sentiments of pain or pleasure. It is composed of parts, a framed substance, not inchoative, and not consisting of the three elements, earth, water, and fire, as some say, nor of four or all the five elements (viz., air and ether in addition to the former), as others maintain, but merely earthy. *c. Organs of sensation* (*indriya*); from the elements, earth, water, light, air, and ether, they are smell, taste, sight, touch, and hearing. *d. Their objects* (*artha*). They are the qualities of earth, etc.—viz., odor, savor, color, tangibility, and sound. *e. Understanding* (*buddhi*), or *apprehension* (*upalabdhi*), or *conception* (*jnâna*), terms used synonymously. It is not eternal, as the Sânkhya maintains, but transitory. *f. The organ of imagination and volition* (*manas*). Its property is the not giving rise simultaneously to more notions than one. *g. Activity* (*pravr'itti*), or that which originates the utterances of the voice, the cognitions of the understanding, and the gestures of the body. It is therefore oral, mental, or corporeal, and the reason of all worldly proceedings. *h. Faults* or *failings* (*dosha*), which cause activity—viz., affection, aversion, and

bewilderment. *i. Transmigration* (*pretyabhâva*, literally the becoming born after having died), or the regeneration of the soul, which commences with one's first birth, and ends only with final emancipation. It belongs not to the body, because the latter is different in successive births; but to the soul, because it is eternal. *k. Fruit* or *retribution* (*phala*), or that which accrues from activity and failings. It is the consciousness of pleasure or of pain. *l. Pain* (*duh'kha*), or that which has the characteristic mark of causing vexation. It is defined as 'the occurrence of birth,' or the originating of 'body,' since body is associated with various kinds of distress. Pleasure is not denied to exist, but according to the Nyâya, it deserves little consideration, since it is ever closely connected with pain. *m. Absolute deliverance* or *emancipation* (*apavarga*). It is annihilation of pain, or absolute cessation of one's troubles.

After (1) 'instruments of right notion,' and (2) 'the objects of inquiry,' the N. proceeds to the investigation of the following topics.

3. *Doubt* (*sam's'aya*). It arises from unsteadiness in the recognition or non-recognition of some mark, which, if we were sure of its presence or absence, would determine the subject to be so or so, or not to be so or so, but it may arise also from conflicting testimony. 4. *Motive* (*prayojana*), or that by which a person is moved to action. 5. *A familiar case* (*dr'ish'tânta*), or that in regard to which a man of an ordinary and a man of a superior intellect entertain the same opinion. 6. *Tenet* or *dogma* (*siddhânta*). It is either 'a tenet of all schools,' i.e., universally acknowledged, or 'a tenet peculiar to some school,' i.e., partially acknowledged; or 'a hypothetical dogma,' i.e., one which rests on the supposed truth of another dogma; or 'an implied dogma,' i.e., one the correctness of which is not expressly proved, but tacitly admitted by the Nyâya. 7. The different members (*avayava*) of a regular argument or *syllogism* (*nyâya*). 8. *Confutation*, or reduction to absurdity (*tarka*). It consists in directing a person who does not apprehend the force of the argument as first presented to him, to look at it from an opposite point of view. 9. *Ascertainment* (*nirn'aya*). It is the determination of a question by hearing both what is to be said for and against it, after having been in doubt. The three next topics relate to the topic of controversy—viz., 10. *Discussion* (*vâda*), which is defined as consisting in the defending by proofs on the part of the one disputant, and the controverting it by objections on the part of the other, without discordance in respect of the principles on which the conclusion is to depend; it is, in short, an honest sort of discussion, such, for instance, as takes place between a preceptor and his pupil, and where the debate is conducted without ambition of victory. 11. *Wrangling* (*jalpa*), consisting in the defense or attack of a proposition by means of tricks, futilities, and like means; it is therefore a kind of discussion where the disputants are merely desirous of victory, instead of being desirous of truth. 12 *Cavilling* (*vitun'd'a*), when a man does not attempt to establish the opposite side

of the question, but confines himself to carping disingenuously at the arguments of the other party. 13. *Fallacies*, or semblances of reasons (*hetvâbhâsa*), five sorts of which are distinguished, viz., the erratic, the contradictory, the equally available on both sides, that which, standing itself in the need of proof, does not differ from that which is to be proved, and that which is adduced when the time is not that when it might have availed. 14. *Tricks*, or unfairness in disputation (*chhala*), or the opposing of a proposition by means of assuming a different sense from that which the objector well knows the propounder intended to convey by his terms. It is distinguished as verbal misconstruing of what is ambiguous, as perverting, in a literal sense, what is said in a metaphorical one, and as generalizing what is particular. 15. *Futile objections* (*jâti*), of which 24 sorts are enumerated: and, 16. Failure in argument or reason of defeat (*nigraha-sthâna*), of which 22 distinctions are specified.

The great prominence given by the N. to the *method*, by means of which truth might be ascertained, has sometimes misled European writers into the belief that it is merely a system of formal logic, not engaged in metaphysical investigations. But though the foregoing enumeration of the topics treated by it could touch on only the main points which form the subject-matter of the N., it shows that the N. was intended to be a complete system of philosophical investigation; and some questions, such as the nature of intellect, articulated sound, etc., or those of genus, variety, and individual, it has dealt with in a masterly manner, deserving the notice of western speculation. That the atomistic theory has been devolved from it, is shown under VAIS'ESHIKA. The prominent position, however, which the *method* of discussion holds in this system, and the frequent allusion made by European writers to a Hindu syllogism, makes it expedient to explain how the N. defines the 'different members of a syllogism' under its seventh topic. A regular argument consists, according to it, of five members—viz., *a*. the proposition (*pratijnâ*), or the declaration of what is to be established; *b*. the reason (*hetu*), or 'the means for the establishing of what is to be established;' *c*. the *example* (*udâharan'a*), i.e., some familiar case illustrating the fact to be established, or, inversely, some familiar case illustrating the impossibility of the contrary fact; *d*. the application (*upanaya*), or 'restatement of that in respect of which something is to be established;' and *e*. the conclusion (*nigamana*), or 'the restating of the proposition because of the mention of the reason.' An instance of such a syllogism would run accordingly thus: *a*. This hill is fiery, *b*. for it smokes, *c*. as a culinary hearth, or (inversely) not as a lake, from which vapor is seen arising, vapor not being smoke, because a lake is invariably devoid of fire; *d*. accordingly, the hill is smoking; *e*. therefore, it is fiery.

The founder of the N. system is reputed under the name of *Gotama*, or, as it also occurs, *Gautama* (which would mean a descendant of Gotama). There is, however, nothing

as yet known as to the history of this personage or the time when he lived, though it is probable that the work attributed to him is, in its present shape, later than the work of the great grammarian Pân'ini. It consists of five books or *Adhyâyas*, each divided into two 'days,' or diurnal lessons, again subdivided into sections or topics, each of which contains several aphorisms, or *Sûtras:* see SÛTRA. It has been explained or annotated by a triple set of commentaries, which, in their turn, have become the source of more popular or elementary treatises.—The Sanskrit text of the Sûtras of Gotama, with a commentary by *Vis'wanâtha*, has been edited at Calcutta (1828); and the first four books, and part of the fifth, of the text, with an English version, an English commentary, and extracts from the Sanskrit commentary of Vis'wanâtha, by the late Dr. J. R. Ballantyne (Allahabad 1850–54). This excellent English version and commentary, and the celebrated Essay on the N., by H. T. Colebrooke (*Transactions of the Royal Asiatic Society*, I. London 1827; reprinted in the *Miscellaneous Essays*, I. London 1837), are the best guide for the European student who, without a knowledge of Sanskrit, would wish to familiarize himself with the N. system.

NYCTAGINACEÆ, *nĭk-ta-jĭ-nā'sē-ē:* a natural order of exogenous plants, consisting partly of herbaceous plants, both annual and perennial, partly of shrubs and trees. Lindley ranks them in his *Chenapodal Alliance.* The flowers are either clustered or solitary, and either the cluster or the flower frequently has an involucre, which is often gayly colored. The perianth is tubular, plaited in bud, colored; the limb entire or toothed, deciduous. The stamens are equal in number to the lobes of the perianth. The ovary is superior, with one ovule, and one style. The fruit is a thin *caryopsis*, inclosed within the enlarged and indurated base of the perianth.—There are about 100 known species, natives of warm countries. Some have flowers of considerable beauty, e.g., of the genus *Mirabilis*, known in gardens as *Marvel of Peru*, one of which, *M. Jalapa*, was at one time erroneously supposed to produce jalap. The roots of many are fleshy, purgative, and emetic. Those of *Boerhaavia paniculata* are used instead of ipecacuanha both in Guiana and in Java.

NYCTALOPIA, n. *nĭk'tă-lō'pĭ-ă*, or NYCTALOPY, n. *nĭk'tă-lō-pĭ* [Gr. *nuktalōps;* L. *nyctalops*, used by ancient authors in two opposite senses—'not seeing at night,' and 'seeing only at night'—from Gr. *nukta*, night; *ōps*, the eye]: night-blindness; diseased condition of the eye in which a person who sees distinctly by day loses his vision partially or entirely at approach of night. The disease may continue one night or a year; but its usual duration is two weeks to three or four months. It is most frequent in hot climates where there is strong sun-glare, also in snowy regions. The disease usually passes away of itself after a time. NYCTALOPS, n. *nĭk'tă-lŏps*, one affected with the disease nyctalopia. *Note.*—NYCTALOPIA is by some writers applied in the opposite sense of vision obscured by day and good at night (see HEMERALOPIA).

NYCTERIBIA, *nĭk-tĕr-ĭb'ĭ-a:* extremely curious genus of insects, ranked in the order *Diptera,* though very different from most of that order, and having neither wings nor balancers. Its nearest alliance is with *Hippoboscidæ* (see FOREST FLY: SHEEP TICK), which it resembles particularly in parasitic habits, and in the retention of the eggs within the abdomen of the female, until they have not only been hatched, but have passed from the larva into the pupa state. The form, however, is so spider-like, that these insects were at first ranked among the *Arachnida.* The few species known all are parasitic on bats, on which they run about with great activity. The head is very small, curiously affixed to the back of the thorax, and when the creature sucks the blood of the bat, upon which it lives, it places itself in a reversed position.

NYIREGYHAZA, *nyēr-ĕdj-hâ'zŏh* or *ñē-rĕdj-hâ'zŏh:* a town of Hungary, in the county of Szabolcs, on the railway between Debreczin and Tokay. The trade in agricultural produce is considerable. N. has salt, soda, and saltpetre works. There are mineral springs in the neighborhood. Pop. 33,100.

NYKERK, *nī'kĕrk,* or NIEUWKERK, *nyüv'kĕrk:* on the Veluwe, very flourishing and well-built town, near the Zuyder Zee, province of Gelderland, Netherlands, 25 m. n.w. of Arnheim. Pop. 8,000. It has a good harbor, connected with the sea by a wide canal 1½ m. in length. In the neighborhood are rich meadow-pastures and lands suited for all kinds of grain, tobacco, potatoes, etc. Tobacco is extensively grown; many cattle are raised, and there is a brisk trade both with the surrounding country and with Amsterdam, the market to which the cattle, tobacco, dairy, and other agricultural produce, with much firewood, are sent. N. has a handsome Reformed church, a Rom. Cath. chapel, a synagogue, orphan-house, and good schools. There are also several manufactures. In Netherlands' church history, N. is famed as the place where a great religious movement began at the middle of the 18th c., and spreading throughout the land, showed all the marks of the later revivals in America, Scotland, and Ireland. See Ypey and Dermout's *Geschiedenis der Nederd. Her. Kerk,* vol. iv.

NYKÖPING, *nü'chö-pĭng:* seaport of Sweden, pleasantly situated on the Baltic, lat. 58° 45′ n., long. 17° e., about 60 m. s.w. of Stockholm. It comprises among its manufacturing products cotton goods, stockings, tobacco, etc., and has good ship-yards, mills, and manufactories for machinery. Near the town are extensive paper-mills. The ruined old castle of N., nearly destroyed by fire 1665, and which ranked in strength next to those of Stockholm and Calmar, has experienced many vicissitudes of fortune. King Valdemar of Sweden, after his dethronement 1288, was imprisoned here till his death 1302; but the most tragic incident connected with N. Castle was the horrible death within its walls of the Dukes Eric and Valdemar, who, after being entrapped by their pusillanimous brother, King Birger, 1317, were left to perish of hunger in a

dungeon, the keys of which the king threw into the sea before he left the castle. The horror of this deed roused the indignation of the people, who seized upon the castle, sacked it, and demolished its keep and donjons. In 1719, the town was taken and dismantled by the Russians; and since then it has ceased to be the scene of any events of historical interest. It is noted for the pure Swedish spoken by its inhabitants. Pop 7,400.

NYLGAU, or NYLGHAU, n. *nīl'gaw*, or NILGAI, or NEELGHAU [Hind. *nil*, blue; *gaw*, a cow or bull—*lit.*, the blue-cow]. (*Antilope picta* or *Portax tragocamelus*): species of antelope, with somewhat ox-like head and body, but with long slender limbs, and of great activity and fleetness. It is one of the largest of antelopes, and is more than four ft. high at the shoulder. The horns of the male are about as long as the ears, smooth, black, pointed, slightly curved forward. The female has no horns. The

Nylgau (*Antilope picta*).

neck is deep and compressed, not rounded as in most of the antelopes. A slight mane runs along the neck and part of the back, and the breast is adorned with a long hanging tuft of hair. The back is elevated almost into a hump between the shoulders. The N. inhabits the dense forests of India and Persia, where it has long been regarded as one of the noblest kinds of game. It is often taken, like other large animals, by inclosing a large space with nets, and by great numbers of people. It is a spirited animal, and dangerous to a rash assailant. It is capable of domestication, but is said to have an irritable and capricious temper.

NYMPH, n. *nĭmf* [L. *nympha;* Gr. *numphē;* F. *nymphe*, a nymph]: in *classic mythology*, a female divinity of inferior rank, inhabiting the sea, streams, groves, meadows, and pastures, grottoes, fountains, hills, glens, trees, etc. Different classes of nymphs were distinguished, par-

ticularly the *Oceanides*, daughters of Oceanus (Nymphs of the great ocean which flows around the earth), the *Nereids*, daughters of Nereus (Nymphs of the inner depths of the sea, or of the Inner Sea—the Mediterranean), *Potameides* (River Nymphs). *Naiads* (Nymphs of fountains, lakes, brooks, wells), *Oreades* (Mountain Nymphs), *Dryads* or *Hamadryads* (Forest Nymphs, who were believed to die with the trees in which they dwelt). The Nymphs were the goddesses of fertilizing moisture, and were represented as taking an interest in the nourishment and growth of infants, and as being addicted to the chase (companions of the divine huntress Diana), to female occupations, and to dancing. They are among the most beautiful conceptions of the plastic fancy of the ancient Greeks, who, in the various phenomena of nature felt, with a poetic vividness that our modern science will hardly permit to us, the presence of unseen vital and personal powers. In *poetry*, Nymph is the symbol of a beautiful young woman. NYMPH-LIKE, a. resembling nymphs or becoming to them. NYMPHA, n. *nĭm'fă*, the second state, pupa, or chrysalis of an insect: plu. NYM'PHÆ, *-fē*. NYMPHEAN, a. *nĭm-fē'ăn*, or NYMPHICAL, a. *nĭm'fĭ-kăl*, pertaining to nymphs; inhabited by nymphs. NYMPHS, n. plu. the active pupæ of certain insects.

NYMPHÆACEÆ, *nĭm-fē-ā'sē-ē:* natural order of exogenous plants, growing in lakes, ponds, ditches, and slow rivers, where their fleshy rootstocks are prostrate in the mud at the bottom; and their large, long-stalked, heart-shaped, or peltate leaves float on the surface of the water. Their flowers also either float, or are raised on their stalks a little above the water. The flowers are large, and often very beautiful and fragrant. There are usually four sepals, and numerous petals and stamens, often passing gradually into one another. The ovary is many-celled, with radiating stigmas, and very numerous ovules, and is more or less surrounded by a large fleshy disk. The seeds have a farinaceous albumen. More than 50 species are known, natives mostly of warm and temperate regions. The rootstocks of some are used as food, and the seeds of many.—See WATER-LILY; LOTUS; VICTORIA; EURYALE.—Very nearly allied to N. are *Nelumbiaceæ:* see NELUMBO.

NYMPHOLEPSY, n. *nĭm'fō-lĕp'sĭ* [Gr. *numphē*, a nymph-goddess; *lēpsis*, taking—from *lambanō*, I take]: a frenzy occasioned by seeing one of the nymphs; fascination through a nymph-goddess.

NYMPHOMANIA, n. *nĭm'fō-mā'nĭa* [Gr. **νύμφη**, nymph, a bride, **μανία** madness]: a morbid condition in women manifesting itself in an uncontrollable impulse to satisfy the sexual passion. In men the disturbance is called satyriasis. It is usually a transitory phenomenon coming at the beginning of insanity or during the course of various mental disorders.

NYORO, *nvō'rō*: a Bantu tribe living on the shores of Lake Albert Edward, in Africa. As a race they are well built, tall and good-looking. They live in cone-shaped, thatched huts and make dugout canoes and rafts. They lived principally on sweet potatoes, fish and game. They are said to number about 125,000.

NYREN, *nû-rān'*, MAGNUS: Swedish astronomer: b. Wermland, Sweden, 1837, Feb. 21. He was educated at Upsala and became an instructor in the Pulkova Observatory in 1868. His astronomical researches have been of great value and he was made vice-director of the Observatory at Pulkova in 1890. He has published: *Bestimmung der Nutation der Erdachse* (1873); *Variations de la latitude de Poulkova* (1893); etc.

NYS'SA. See TUPELO.

NYSTAGMOS, n. *nĭs-tăg'mŏs* [Gr. *nus'tagmos*, slumbering with nodding]: an involuntary occillation of the eyeball caused by epasmodic contractions of the muscles of the eye. The movements of the eyeball may be in a lateral, a vertical, or a rotary direction. Both eyes are usually affected. The affection is commou in albinos and in others with defective eyes. It may be due to fatigue, and is not infrequently seen in coal miners who have to work in a constrained position and in poor light, the head being lowered while the eyes are turned obliquely upward. Nystagmos occurs also as a symptom in a number of nervous diseases. In the treatment of nystagmos the cause must, if possible, be suppressed; care should be taken not to use the eyes in a poor light, and any defects of vision should be corrected by properly fitted glasses.

NYX, *nĭks:* in Greek mythology, the goddess of night or darkness. She was the daughter of Chaos. Her brother was Erebus.

O

O, or o, *ō:* fifteenth letter in the English and in most western alphabets; fourth of the English vowels. As the language is at present pronounced, it stands for four or five distinct sounds, heard in the words *note, nōr* (nŏt), *move, son.* The primary and simple sound of O is that heard long in *nōr,* and short in *nŏt, tŏp.* The sound given to it in such words as *note, go,* is really a diphthong—a long *o* terminating in a slight *u* or *oo* sound (O—^{u}). The corresponding letter in the Hebrew and Phœnician Alphabet (q.v.) was called Ayn, i.e., 'eye;' accordingly the primitive form of the Phœnician letter was a rough picture of an eye, which naturally became a circle with a dot in the centre—still seen in some ancient inscriptions—and later a simple circle. O is used to designate a space inclosed by a circular boundary: also in the sense of nothing, or absence of a significant number: in *arith.,* a cipher; zero. O's or Oes, rings or small circles.

O', a prefix in many Irish family names, serves to form a patronimic, like *Mac* (son) in Gaelic names; as O'Brien, a descendant of Brien. By some, it is considered to be derived from *of;* but it is more likely from Ir. *ua,* Gael. *ogha,* a grandson. In Lowland Scottish, the word *oe* is used for grandson, and in some localities for nephew.

O, or Oh, int. *ō* [Goth. *o;* L. *o;* Gr. *ō*]: natural exclamatory sound, used in addressing a person or a personified object, to express invoking or imploring, and nearly always in addressing the Deity. Some writers attempt to distinguish *Oh* as employed to express an earnest wish, admiration, or pity, warning, pain, sorrow, surprise, or dissent; while *O* is reserved for earnest personal address; but the best writers use the two forms indiscriminately, *O* being now most usual. The point (!) called the point of exclamation is often put after *O* and *oh,* but when rightly used the (!) ought to be placed after the noun only—the O, in fact, only marking the vocative case. Oh dear and Oh dear me [generally regarded as corruptions of F. *O Dieu,* or It. *O Dio,* O God, and It. *O Dio mio,* O my God]: exclamations expressive of surprise, uneasiness or exhaustion, fear, pain, and the like. O yes: see Oyes.

OAF, n. *ōf* [Icel. *alfr,* an elf or fairy: comp. Gael. *amh* = *ăv,* a fool]: a foolish child, or idiot, left by fairies in place of another who is carried off by them; a changeling; a dolt; a blockhead. Oaf'ish, a. *-ĭsh,* stupid.

OAHU, *wâ'hô,* or *ō-â'hô:* one of the Sandwich Islands (q.v.).

OAJACO, or OAXACA, *wâ-châ'kâ*, or Guaxaca, *gwâ-châ'kâ:* state in Mex., bordering on Pacific Ocean and Gulf of Tehauntepec; it is 270 miles long on Pacific shore, its greatest breadth being 170 m.; 27,389 sq. m. The surface is very mountainous, being crossed by the Mexican Andes and its two lateral branches, which divide the region into valleys and gorges of surpassing beauty. The principal rivers are the Rio Grande, Alvarado and Cape Verde. O. is one of the most beautiful and cultivated districts in Mexico; the soil is very fertile, and when properly irrigated will yield two crops of wheat and maize annually. The climate is delightful and healthful, with all the variations of the temperate and torrid zones. Gold, silver, lead, and iron abound; but the mines are comparatively undeveloped. The chief agricultural products are sugar, coffee, cotton, cacao, tobacco, indigo, and a great variety of fruits; valuable timber and dye-woods are found; cochineal is an important product. Manufactures are numerous, and the school statistics show that education is not neglected. The inhabitants are mostly mestizoes and Indian tribes. Pop. (1892) 793,419; (1900) 947,910.

OAJA'CA, or OAXA'CA, or GUAXA'CA: city of Mexico, cap. of the state of O.; on the river Rio Verde, 210 m. s.s.e. of Mexico; 1,600 ft. above sea-level. It covers an area 2 m. in length by 1¼ in breadth, is well built, with open streets, interspersed with plantations, on which the cochineal insect feeds. Silk, cotton, sugar, and chocolate are manufactured. O. dates from 1522. It suffered from earthquake 1870. Pop. (1892) 27,856; (1900) 35,049

OAK, n. *ōk* [AS. *ac;* Icel. *eyk;* Ger. *eiche*, an oak]: tree of many species; also its wood, used in ship-building and for many other purposes, noted for hardness and durability; the common oak is the *Quercus pedun'culātă* or *robur*, ord. *Cupulif'ĕræ* or *Cor'ylācĕæ* (see below). OAKEN, a. *ōk'n*, made of oak. OAK'LING, n. *-lĭng* [*oak*, and *ling*, a dim. termination]: a young oak. OAK-APPLE, a kind of gall, being a spongy excrescence on oak-leaves and tender branches (see GALL or GALL-NUT: GALL-FLY). OAK-BARK, the bark of the oak, used in tanning. OAK-FERN, a delicate wild fern, the *Polyōdĭŭm Dryopteris*, ord. *Filĭcēs*. OAK-LEATHER, a kind of fungus spawn in old oaks having the appearance of white kid-leather. OAK-PAPER, paper-hangings stained like the grain of oak wood.

OAK (*Quercus*): genus of trees and shrubs of nat. order *Cupuliferæ*, having a three-celled ovary, and a round (not angular) nut—called an *acorn*—placed in a scaly truncated cup, the lower part of it invested by the cup. The species are very numerous, natives of temperate and tropical countries. A few species are found in Europe. N. America produces many; and many are natives of mountainous regions in the torrid zone; some are found at low elevations in the valleys of the Himalaya, some even at the level of the sea in the Malay peninsula and Indian islands. But in the peninsula of India and in Ceylon, none are found; and none in tropical Africa, in Australia, or in S America. The oaks have alternate simple leaves, entire in some, but in the greater number variously lobed and sinuated or cut; evergreen in some, but generally deciduous. Many of the trees are of great size, famous for strength and durability of timber, as well as for majesty of appearance, and great longevity.—Throughout all Europe, except the extreme north, two species are found, or varieties of one species, the COMMON OAK (*Q. robur*), the only indigenous British species; one variety (*Q. pedunculata*) having the acorns on long stalks, the other (*Q. sessiliflora*) having them almost without stalks. Other differences have been pointed out; but they are regarded by some of the most eminent and careful botanists as merely accidental, and not coincident with these; while, as to the length of the fruit-stalks, every intermediate gradation occurs. Both varieties, occur in Britain, the first being the most prevalent, as it is generally in n. Europe; the second being more abundant in more southern countries. The short-stalked oak is called sometimes DURMAST OAK in England. It has been much disputed which is entitled to be considered the true British oak; and much alarm has occasionally been expressed lest new plantations should be made of the wrong kind; while contradictory statements have been made as to the comparative value and characters of the timber. The oak succeeds best in loamy soils, especially in those somewhat calcareous. It cannot endure stagnant water. It succeeds well on soils too poor for ash or elm; but depends much on the depth of the soil, its roots penetrating more deeply than those of most other trees. Noble specimens of oak trees, and some historically celebrated, exist in almost all parts of Britain; but are much more frequent in England than in Scotland. The former existence of great oak forests is attested by the huge trunks often found in bogs, The oak attains a height of 50 to 100 or even 150 or 180 ft.; the trunk being four, six, or even eight ft. in diameter. It sometimes grows tall and stately, but often rather shows great thickness of bole and magnitude of branches. It reaches its full size in periods varying from 120 to 400 years, but lives to the age of 600, or even 1,000 years. The timber is very solid, durable, peculiarly unsusceptible of the influence of moisture, and therefore eminently adapted for ship-building. It is used also in carpentry, mill-work, etc.—The bark abounds in tannin; it contains also a peculiar bitter principle called *Quercine*, and is used in medicine, chiefly

in gargles, etc., on account of its astringency, sometimes also as a tonic; it is used with gall-nuts in manufacture of ink; but most of all for tanning (see BARK), and on this account the oak is often planted as copse-wood (see COPSE) in situations where it cannot be expected to attain great size as a tree. The timber of copse oak is excellent firewood. The oak is particularly fitted for copse-wood, by the readiness with which it springs again from the stools after it has been cut.—Acorns are very nourishing food for swine, and in times of scarcity have been used often for human food, as, indeed, they commonly are in some very poor countries, either alone or mixed with meal. The bitterness which makes them disagreeable is said to be in part removed by burying them for a time in the earth. The acorns of some trees are much less bitter than others, and oaks of the common species occur which produce acorns as sweet as chestnuts. Other varieties of the common oak are assiduously propagated by nurserymen as curious and ornamental, particularly one with pendulous branchlets (the *Weeping Oak*), and one with branches growing up close to the stem, as in some kinds of poplar. Among the Greeks and Romans, the oak was sacred to Zeus or Jupiter; and it has been connected with the religious observances of many nations, as of the ancient Celts and Germans.—The TURKEY OAK or ADRIATIC OAK (*Q. cerris*), now very frequently planted in Britain, is a large and valuable tree, very common in s.e. Europe, and parts of Asia. The timber is imported in considerable quantity into Britain for ship-building and other purposes. The leaves differ from those of the common oak in their acute lobes, and the cups of the acorns are *mossy* i.e., have long, loose, acute scales. Similar to this, in both these respects, are the AUSTRIAN OAK (*Q. Austriaca*), abundant near Vienna, and the SPANISH OAK (*Q. Hispanica*).—For the CORK OAK or CORK TREE (*Q. suber*), see CORK; for the HOLM OAK or EVERGREEN OAK (*Q. ilex*), another of the species found in s. Europe, see ILEX.—Of the N. Amer. oaks, some are very valuable as timber trees. Perhaps the most important is the WHITE OAK or QUEBEC OAK (*Q. alba*), a large tree, the leaves of which have a few rounded lobes. It is found from the Gulf of Mexico to Canada; and in some places forms the chief part of the forest. The timber is less compact than that of the British oak; that of young trees is very elastic.—The OVERCUP OAK (*Q. lyrata*), a majestic tree, highly esteemed for its timber, and having its acorns almost covered by their globular cup, grows chiefly in lands liable to inundation in the Southern States.—The CHESTNUT-LEAVED WHITE OAK (*Q. prinus*), also is a much-esteemed timber-tree of the Southern States.—The SWAMP WHITE OAK (*Q. bicolor*), a closely allied species, extends further north.—The LIVE OAK (*Q. virens*), an evergreen species, with entire leathery leaves, is regarded as a tree of the first importance in the United States, from the excellence of its timber and its value for ship-building, so that efforts have been made by the govt. to protect it and to promote the planting of its

acorns. Yet it is not a very large tree, being seldom more than 45 ft. in height, with a trunk of two ft. in diameter. It grows on the Gulf of Mexico, and as far n. as Va. It abounded formerly on the Sea Islands, now noted for their cotton.—The RED OAK (*Q. rubra*), a large tree, with sinuated and lobed leaves, the lobes toothed and bristle-pointed, yields great part of the *Red Oak Staves* exported from Canada and the n. of the United States to the W. Indies; but *Red Oak Staves* are produced in the Middle and Southern States by the SCARLET OAK (*Q. coccinea*), also, a very similar species; by the BLACK OAK or QUERCITRON OAK (*Q. tinctoria*), another species with the lobes of the leaves bristle-pointed, better known for the dye-stuff which its bark yields (see QUERCITRON); and by the WILLOW OAK (*Q. phellos*), a large tree with lanceolate leaves and a willow-like aspect. The timber of these species is inferior. These are the American oaks of greatest economical and commercial importance, but there are numerous other species, some of them trees, some mere shrubs, of which some grow on poor soils, and cover them in compact masses; resembling in this a single European species (*Q. viminalis*), native of the Vosges, 6–8 ft. high, with slender tough branches, which makes excellent hedges.—The BLACK JACK (*Q. nigra*), is an American oak, notable chiefly for abundant growth on some of the poorest soils. It is a small tree, and its timber of little value. The bark is black.—Some of the Nepaulese oaks are large and valuable, as are some of those of China and Japan, of Java, of Mexico, etc. The oaks of Java and the other Indian islands, have generally the leaves quite entire.—The bark of most of the species of oak is capable of being used for tanning, and is so used in different countries. The cups and acorns of the VALONIA OAK (*Q. Ægilops*), are exported from the Morea and other parts of the Levant, in great quantities, for this purpose, under the name *Valonia:* see LEATHER. The tree resembles the Turkey Oak, and has very large hemispherical mossy cups. The cups are said to contain more tannin than any other vegetable substance.—Galls or Gall-nuts are in great part obtained from the oak therefore called the GALL-OAK (*Q. infectoria*), a scrubby bush, native of Asia Minor, with bluntly serrated, ovate oblong leaves (see GALL or GALL-NUT: GALL-FLY).—The KERMES OAK (*Q. coccifera*), on whose leaves the Kermes (q.v.) insect is found, is a low bush, with evergreen spinous leaves, resembling a holly, native of s.e. Europe.—Of oaks with sweet and edible acorns, are the BALLOTE OAK (*Q. Ballota* or *Gramuntia*), an evergreen with round spiny-toothed leaves, native of n. Africa, whose long cylindrical acorns are regularly brought to market in Algeria and in Spain; the ITALIAN OAK (*Q. Æsculus*), closely allied to the common oak; and the DWARF CHESTNUT OAK (*Q. chinquapin* or *prinoides*), of N. America, a small shrubby species, often called Chinquapin, and specially commended for cultivation for its edible nuts. Other N. Amer. species, and some Himalayan species, also produce edible acorns. From the acorns

of some species, oil for use in cookery is made in different parts of the world.—The leaves of the MANNA OAK (*Q. mannifera*)—native of the mountains of Kurdistan, having oblong, blunt-lobed leaves—secrete in hot weather a kind of manna, a sweet mucilaginous substance, which is made into sweetmeats, and much esteemed.

The name oak is sometimes popularly applied to timber trees of very different genera. Thus AFRICAN OAK is another name for African Teak: see TEAK. Some species of *Casuarina* (q.v.) are called Oak in Australia. The STONE OAK (*Lithocarpus Javenensis*) of Java, so named from the extreme hardness of its timber, is of the same family with the true oaks.—See OAKS.

OAK BEAUTY (*Biston prodromaria*): moth of family *Geometridæ*, native of England, about an inch and a half or two inches in expanse of wings; the upper wings with two brown curved bands margined with black, the lower wings with one brown band. Its caterpillar feeds on the oak.

OAKES, *ōks*, URIAH, D.D.: 1631–1681, July 25; b. England. He came to America 1634, and graduated at Harvard 1649. He studied theology, preached for a short time at Roxbury, Mass., and then settled in Titchfield England. He was compelled to relinquish his charge 1662, because of his nonconformist views, but he afterward presided over another congregation. He was called as pastor of the First Church (Congl.) at Cambridge, Mass., 1668, at the death of Jonathan Mitchell, but he did not begin his work till 1671. In 1675, April 7, he assumed the duties of pres. of Harvard College, to which office he had been appointed, and was formally installed 1680, Feb. 2. His published writing, include a series of astronomical calculations issued in his early youth, and the Sermons, Latin Eulogy, and Elegy in English verse of his later years. He died in Cambridge.

OAKHAM, *ō'kam:* county-town of Rutlandshire, England; in the vale of Catmos, 25 m. w.n.w. of Peterborough. The castle is in ruins except the portion used as the county hall. The church, restored 1858, is in the perpendicular style, and has a fine tower and spire. The Free Grammar-school, with endowment of about £700 a year, was founded 1581. Pop. 3,300.

CITY HALL SQUARE, OAKLAND, CALIFORNIA.

OAKLAND.

OAKLAND, *ōk'land:* city, cap. of Alameda co., Cal., on the e. side of San Francisco Bay, opposite San Francisco, about 7 m. distant, 133 m. s.w. of Sacramento; on railroads belonging to the Southern Pacific Company's system. The harbor is large and excellent, and communication with many interior points is furnished by the San Joaquin and the Sacramento rivers. Two steam railroads and ferries furnish regular and frequent communication with San Francisco. The estuary is crossed by three drawbridges, two of which are used by railroads. The city has good public and parish schools, high school and observatory, academies, a theological seminary (Congl.), California College (Bapt.), a college for girls, a convent, a well-equipped library in a Carnegie building, with land ($20,000) cost $70,000, handsome churches, and several benevolent institutions. Among the fine public buildings are the courthouse, erected at a cost of $200,000; a city hall, and a hall of records. There are several fine hotels and numerous costly residences. The city is well laid out, on a plateau rising from the bay, and on the other sides flanked by hills; the streets are wide, shaded by large oak trees, and are lighted by gas. An abundant supply of pure water is obtained from the adjacent hills, and a reservoir of salt water is kept for flushing the sewers. The principal streets are macadamized, and there are several lines of horse and cable cars. The police and fire departments are thoroughly organized and well sustained. The harbor and railroads give the city excellent commercial facilities. Manufactures are varied and extensive, and are rapidly increasing: they include leather, shoes, cordage, cotton-goods, and woolen goods, nails, furniture, carriages, windmills, and various agricultural implements. There are also marble-works and iron-works, glass-works, potteries, flouring-mills and planing-mills, a quartz-mill, smelting works, a jute factory said to turn out 5,000,000 sacks each year, and large fruit-preserving establishments. In the immediate vicinity of the city are numerous fine country places adorned with gardens and flowers. There are also large vineyards, productive fruit farms, and many beautiful drives. At Berkeley, 5 m. n., is the Univ. of California, which was removed from O.; also a state institution for the deaf, dumb, and blind; and the State Agricultural College. The first settlement at O. was made 1850, and a town was incorporated two years later. It made but little progress till 1868, when the Central Pacific Company gave it railroad and ferry communication with San Francisco and other points. Since that date its growth has been very rapid. It furnishes homes for many people doing business in San Francisco, and is a favorite resort for tourists and invalids. The climate is remarkably uniform, and is so mild that such plants as the fuchsia and geranium can safely be left in the ground during winter without protection. The mean maximum temperature is 91°, and the mean lowest temperature 32°. Pop. (1900) 66,960; (1910) 150,174.

OAKS, in North America: see OAK.—Agassiz spoke of America as the old world, because many of our trees, the remarkable variety of oaks especially, characterize the past tertiary age in Europe, though not the same species. There are about 40 species of oak in N. Amer., of which one-half occur in the n. states. Besides their value as timber, etc., they offer a great variety in landscape or for ornamental purposes, having the recommendation of clean green foliage, holding it late, with deep, rich, autumn tints, some of them with a contrasting angularity of branches, or other oddity, and some adapted to poor soils and severe exposures. The White O. grows to great size, is picturesque, and turns brown and purple, but retains its faded leaves through winter. The Bur or Mossy-cup O. (*Q. macrocarpa*) is the largest-leafed of the genus, handsome, medium-sized. Of the chestnut-leafed oaks, the Swamp White O. (*Q. bicolor*) has the leaves white-downy beneath, and these turn leathery yellow in autumn; at middle age the growth is graceful and rapid to large size. The Rock Chestnut O. (*Q. prinus*, var. *monticola*) is not large, and is regarded as the best for ornamental planting. The Dwarf Chestnut O. (*Q. prinus*, var. *humilis*), like the Rock, grows on barren ground; it has been proposed as nurse for forest plantations; it grows 2 to 4 ft. high. Of the black and red oaks, the Black Scrub O. (*Q. ilicifolia*) has been suggested for hedges. The Scarlet O. (*Q. coccinea*) has the richest autumn color, and is deep blood-red when seen from beneath in sunlight; its bright, shining green in summer, and fringe-like, almost skeleton leaves, are beautiful. Its variety, the Black O., is orange, dull red, or brownish in the fall. The Red O. turns to purplish red. The Swamp Spanish or Pin O. (*Q. palustris*) is spoken of by Loudon as the most graceful of its genus; in open ground, under cultivation, the lower branches droop. The Willow O. (*Q. Phellos*) is desirable for its oddity. Of foreign oaks, the famous British White O. is much like the Amer.; it is a fine feature in many English parks and wilds. A variety of it droops like the weeping willow, and attains a height of 75 ft. There is a pendulous variety of the Turkey O., the branches of which even creep along the ground after touching it. The Japan Purple O. has in Sep. the fine color that renders the Purple Beach interesting early in the season. These varieties could be grafted on the Amer. White Oak.

OAKUM, n. *ōk'ŭm* [AS. *ácumba:* OHG. *acambi,* tow: AS. *camb,* a comb—*literally,* that which is combed out]: tangled mass of tarred hempen fibres, made from old rope by untwisting the strands and rubbing the fibres free from each other. Its principal use is in Caulking (q.v.) the seams between planks, the space round rivets, bolts, etc., to prevent water from penetrating.

OANNES, *ō-ăn'nēz:* Babylonian god, said in the legend preserved by Berosus and Apollodorus to have come—in the first year of the foundation of Babylon—out of the Persian Gulf, or the old Erythræan Sea, adjoining Babylon. He is described as having the head and body of a fish, to which were added a human head and feet under the fish's head and at the tail. He lived among men during the daytime, without, however, taking any food, and retired at sunset to the sea, from which he had emerged. O. had a human voice, and instructed men in the use of letters, and in all the principal arts and sciences of civilization. Five such monsters are said to have come out of the Persian Gulf; one, called Anedotos or Idotion, in the reign of Amenon, fourth king of Babylon; another in that of the fifth king; and the last, called Odacon (or Ho Dagon), apparently the Phœnician Dagon, under the sixth king. Many figures of O., resembling that of a Triton, having the upper part of a man, and the lower of a fish, or as a man covered with a fish's body, have been found in the sculptures of Kouyunjik and Khorsabad, as well as on many cylinders and gems. O. has by some been taken as a symbol of the conquest of Babylonia by a more civilized nation coming in ships to the mouth of the Euphrates; but he is apparently a water-god, resembling in type and character the Phœnician Dagon, and the Greek Proteus and Triton.—Helladius, *Apud Phot. Cod.* 279, pp. 535, 34: Richter, *De Beroso;* Cory, *Anc. Fragm.,* p. 30; I Sam. v. 4: Bunsen, *Egypt's Place.* I. 706; Layard, *Nineveh.* 343.

Oannes.

Oar.

OAR, n. *ōr* [Icel. *ár;* Dan. *aare;* Fin. *airo;* Esthon. *aer*, an oar: AS. *ár*, an oar; *ear*, the sea —*lit.*, the plowshare of the water (see EARING): comp. L. *aro*, to plow]: a pole with a broad flat end or blade, used in propelling a boat. The form found in practice to combine greatest power with lightness, is shown in the figure. From *a* to *b* is the blade of the oar, thin and nearly flat, though occasionally somewhat curved, so as to present a concave surface to the water; from *b* to *d* is round or square, gradually thickening toward *d*, that the short part *ce* may nearly balance the long part *ac*. At *de* is the handle, to be grasped by one or both hands. The oar rests at *c* on the *row-lock*, and in many cases some device is resorted to, to retain the oar from slipping outward. In the Thames, a leathern stop, called a button, is used; sometimes a pin in the gunwale of the boat passes through the oar (but this weakens the oar, and precludes *feathering*); at other times the oar is fastened to the pin by a leathern thong. The action of an oar in moving a boat is that of a lever, the rower's hand being the power, the water the fulcrum, against which the oar presses, and the row-lock the point at which the opposition caused by the weight of the boat and its cargo is felt. *Feathering* an oar consists in turning it, immediately on leaving the water, so that the flat blade of the oar is horizontal, and in preserving this position until just before the fresh dip, when of course the vertical position must be resumed. Feathering diminishes the resistance offered by air, wind, and small waves; it also adds greatly to the beauty and grace of rowing. The best oars are of Norway fir; though some good oars are made of ash and beech. OAR, v. to row; to impel by rowing. OAR'ING, imp. OARED, pp. *ōrd:* ADJ. furnished with oars. OARY, a. *ōr'ĭ*, having the form of oars. OARSMAN, n. *ōrz'măn*, one who pulls at the oars. OAR-WEED, one of the larger sea plants, having stout woody stems and broad ribbon-like leaves; the genus *Laminārĭă*, ord. *Algæ*. TO BOAT THE OARS, to cease rowing and lay the oars in the boat. TO LIE ON THE OARS, to cease pulling by merely raising them out of the water; to cease from work of any kind for a time; to rest. TO MUFFLE THE OARS, to wrap some soft substance around that part which rests in the row-lock to prevent noise in rowing. TO UNSHIP THE OARS, to take them out of the row-locks

OAR-FISH: the largest deep-sea fish known; belongs to the family of ribbon-fishes (*Trachypteridæ*). Its body is much elongated and compressed, its length being about 15 times its depth; the head, compressed and short, resembles that of a herring; the eye is large, mouth small, and teeth feeble; a many-rayed dorsal fin, whose anterior rays form a crest, extends from the top of the head to the end of the tail; the anal and caudal fins are absent, but the ventrals (its distinguishing feature) are developed into a pair of long filaments paddle-shaped at the end. Most of these fishes measure 12 ft. in length, some exceeding 20 ft. They range everywhere in the ocean depths, but only about 20 captures have been made in a century and a half.

OASIS, n. *ō-ā'sĭs*, OASES, n. plu. *ō-ā'sēz* [Gr. *ŏăsis*, a very fertile spot]: fertile spot occurring around springs in a barren sandy desert; originally the name of the fertile islets in the Libyan desert (called also *Auasis*, *Ouasis*, or *Hoasis*). The principal oases are those w. of Egypt, a few days journey from the Nile, and known to the ancients as the Greater and Lesser Oases, and the oasis of Ammon. It is supposed that they were known to the Egyptians during the 12th dynasty under the name of *Suten-Khenn*, but no evidence of their occupation by the Egyptians earlier than Darius has been found *in situ*. By some of the ancients they were called the Islands of the Blessed, or compared to the spots on a panther's skin. Their name is supposed to be the Coptic *Ouahé* (Inhabited Place). They are mentioned first by Herodotus in his account of the destruction of the army of Cambyses by the storm of sand, or simoom. Equally celebrated is the visit of Alexander the Great to the O., which he successfully accomplished after the conquest of Egypt, and passed through the desert a nine days' journey before he reached the Temple of Ammon, the priests of which declared him the son of that god, and the future conquerer of the entire world. Herodotus describes the oasis of El Wah, the O. Magna of the Romans, which contained the oracle of Ammon, seven days' journey w. of Thebes. It appears to have been anciently frequented by caravans going to the Pillars of Hercules. Strabo mentions three oases: the first seven days' journey w. of Abydos; the second, w. of the Lake Mœris; the third, near the oracle of Ammon. Pliny mentions two oases; so does Ptolemy, who calls them the Less and Greater. Under the Roman empire, they were used for temporary banishment of criminals of state, and the poet Juvenal was sent there. Olympiodorus, native of the Thebaid, gives a glowing description of them in the days of Theodosius the Younger. Under the Byzantine emperors, the emperors banished there the heads of the Catholic party, at the instigation of the Arians, in the 4th c., and Athanasius himself is supposed to have taken refuge in them. In the 5th c., Nestorius, Bp. of Constantinople, was banished there. He was rescued by an excursion of the Blemyes, but expired soon after his arrival at the Nile. The oases were then a place of desolation and horror, occasionally plundered by Bedouins.

They fell into the power of the Arabs, 943, after having been held by the Egyptian monarchs and their successors till that period; and they are described by Edrisi (1150) as uninhabited; by Abulfeda (1240) and by Leo Africanus (1513), as inhabited and cultivated, and quite independent, having three fortresses. The first modern traveller who visited them is supposed to have been Poncet (1698). Subsequently, 1792, Browne discovered the O. of Ammon at El Siwah; and it was visited 1798 by Hornemann, and 1819 by Cailliaud. It lies in 29° 12′ 20″ n. lat., and 26° 6′ 0″ e. long. Drovetti and Minutoli also visited the spot.

Temple of Jupiter Ammon—Oasis of Siwah.
(From Hoskin's *Visit to the Great Oasis.*)

These oases are now held by Muggrebi Arabs, a powerful race in the Desert, capable of raising 30,000 men, who supply camels and guides to travellers. The principal oases are: 1. El Khargeh, or the O. Magna, the Greater Oasis of Ptolemy; 2. El Kasr, or O. Parva, the Lesser Oasis; 3. Siwah, or the O. of Ammon, the most northerly; 4. The Western O., or Dakkel, mentioned by Olympiodorus, and visited by Sir Archibald Edmonstone 1819, and Rohlfs 1874. Of El Khargeh, full particulars have been given by M. Hoskins, who discovered it about 125 m. w. of the Nile, having a stream of water rising near the village of Genah, on the n.w. of the O., and lost in the sand. It is bounded e. by Hagel-bel-Badah. N. of El Gem lies the metropolis, El Khargeh, which consists of a series of covered streets and open bazaars. The temple lies two hours' journey from it, in a fine situation; the *sekos* has a vestibule of 500 ft., with pylons or gateways, the first of which has a decree in Greek, dated in the reign of Galba (A.D. 68), against forcing persons to farm the revenue, preventing imprisonment for debt, preserving the dowries of women, and limiting the office of strategos for three

years. The temple has other decrees preventing the officers of govt. from smuggling. It has an avenue of sphinxes and three pylons; on the third, Darius is represented offering to Amen Ra, Osiris, and Isis; while Nekht-her-hebi (Nectabes) continued the ornaments of the temple about B.C. 414–340. The sekos is 140 ft. long, and represents Darius offering to Amen Ra, or Khnumis, the ram-headed god, and Osiris; while in the accompanying scenes are Anta, or Anaitis, Raspu, or Reseph. In the vicinity is a magnificent necropolis of 150 sepulchres, of a late period, with Doric and Corinthian capitals. There are several temples at other spots of the oases. 2. El Kasr, the O. Parva, lies four or five days' journey s.e. of Siwah, called the Wah-el Bahnasa, or Wah-el-Menesheh, contains no monuments older than the Roman, consisting of a triumphal arch, subterraneous and other aqueducts, several hot springs, a necropolis, and Christian church. This O. was first conquered by the Arabs; and in its vicinity is another O. called Wady Zerzoora, with others adjoining, of inferior interest. 3. Siwah, or the O. of Ammon—one of the first discovered, and repeatedly visited, has, unfortunately, not been seen by any one acquainted with hieroglyphics; it lies w. of the Natron Lakes. It appears from Minutoli that the temple was built by Nekht-her-hebi, or Nectabes I., in honor of the god Khnum, Ammon Khnumis or Chnebis, who, as the deity of water, presided over the water which gave the O. its origin. The O. is nine m. broad and two m. long, contains El Garah Gharmy, and Menchyeh, has a population of about 8,000 inhabitants, possesses date and other trees, grows cereals, and has sulphurous springs, a salt lake at Arachieh, and many ruined temples, a necropolis, and other remains. The oracle of Ammon is supposed to have been at a place called Om-Beydah, or the temple of Nekht-her-hebi. From this, it seems that the O. did not fall into the power of Egypt till about B.C. 5th c. The celebrated Fountain of the Sun is at Siwah Shargieh; 30 paces long, 20 broad, six fathoms deep, with bubbles constantly rising to the surface, steaming in the morning, and warmer at night. Close to it are the remains of the sanctuary of Ammon. 4. El Dakkel, or the W. Oasis, lies about 78 m. s.w. of Siout. The principal ruin at Dar-el-Hadjar consists of a small temple, dedicated to Khnumis by the Roman emperors, Nero and Titus. At Air. Amoor, between this O. and the O. Magna, is a temple built under the Roman empire. The kingdom of Air (q.v.) or Asben, is practically an oasis, and one of the largest in the e. Sahara; it is a table-land with average elevation 2,000 ft., 180 m. long from n. to s. Its fertility is due to the heavy tropical rains precipitated by this elevation of land.—Herodotus, iii. 26; Strabo, ii. 130, xvii. 790, 791, 813; Ptolemy, iv. 5, 37; Minutoli, *Reise zum Tempel des Jupiter Ammon* (Berlin 1824); Hoskins, *Visit to the Great Oasis* (8vo, Lond. 1837); Champollion, *L'Egypte.*

OAST, n. *ōst* [Dut. *ast*, *est*, or *eest*, a kiln: comp. *eit*, a fire, an oven]: a kiln to dry hops or barley malted. OAST-HOUSE, a building for oasts or hop-kilns.

OAT, n. *ōt;* usually in the plural, OATS, *ōts* [AS. *áta:* Fris. *oat*, oat: AS. *æt;* Icel. *ata*, food]: well-known plant and its seed; a grain, one of the cereals. OATEN, a. *ōt'n*, made of oats or oatmeal. OAT-CAKE, a cake made from the meal of oats. OATMEAL, oats dried, shelled, and coarsely ground. WILD OATS, loose or wild habits of young men. TO SOW ONE'S WILD OATS, to indulge in loose habits or forbidden pleasures. TO HAVE SOWN ONE'S WILD OATS implies the abandonment of wild and loose habits; to have become steady and well conducted. *Note.*—Skeat connects AS. *áta* with Icel. *eitill*, a nodule in stone; Norw. *eitel*, a gland, a knob.—*Oats* (*Avēna*) are a genus of grasses, order *Gramineæ*, containing many species, among which are some valuable for the grain which they produce, and some useful for hay. The Linnæan genus *Avēna*, less natural than most of the Linnæan genera, has been much broken up. The genus, as now restricted, has the spikelets in loose panicles, the glumes as long as the florets and containing two or more florets, the paleæ firm and almost cartilaginous, the outer palea of each floret, or of one or more of the florets, bearing on the back a knee-jointed awn, which is twisted at the base. The awn, however, tends to disappear, and often wholly disappears in cultivation. Those species cultivated as grain plants have comparatively large spikelets and seeds, the spikelets—at least after flowering—pendulous. The native country of the cultivated oats is unknown, though probably it is central Asia. There is no reference, however, to the oat in the Old Testament; and though it was known to the Greeks, who called it *Bromos*, and to the Romans, it is probable that they derived their knowledge of it from the Celts, Germans, and other northern nations. It is a grain better suited to moist than to dry, and to cold than to warm, climates, though it does not extend so far north as the coarse kinds of barley. The grain is used either in the form of Groats (q.v.) or as made into meal. Oatmeal cakes and porridge form great part of the food of the peasantry of Scotland and of some other countries. No grain is so much esteemed for feeding horses. Besides a large quantity of starch—about 65 per cent.—and some sugar, gum, and oil, the grain of oats contains almost 20 per cent. of nitrogenous principles, or Proteine (q.v.) compounds, of which about 16 or 17 parts are *Avenine*, a substance very similar to *Caseine* (q.v.), and two or three parts gluten, the remainder albumen. The husk of oats also is nutritious, and is mixed with other food for horses, oxen, and sheep. From the starchy particles adhering to the husk or *seeds* after the separation of the grain, a light dish called *sowans*, made in Scotland by means of boiling water, was formerly very popular, and is suitable for weak stomachs. The grain is sometimes mixed with barley for distillation. The Russian beverage called *quass* is made from oats. The straw of oats is very useful as fodder, bringing a higher price than

any other kind of straw.—The varieties of oats in cultivation are very numerous, and some highly esteemed varieties are of recent and well-known origin. It is doubtful if they really belong to more than one species; though the following are generally distinguished as species: 1. COMMON OAT (*A. sativa*), having a very loose panicle, which spreads on all sides, and two or three fertile florets in each spikelet, the paleæ quite smooth, not more than one floret awned; 2. TARTARIAN OAT (*A. orientalis*), called also HUNGARIAN OAT and SIBERIAN OAT, distinguished chiefly by having the panicle much more contracted and all turned to one side; 3. NAKED OAT (*A. nuda*), differing from the Tartarian Oat chiefly in having the paleæ very slightly adherent to the seeds, which, therefore, fall readily out of them, while in the other kinds they adhere closely; 4. CHINESE OAT (*A. chinensis*), which agrees with the last in the characters of the paleæ and seeds, but is more like the Common Oat in its panicle, and has more numerous florets, 4–8, in the spikelet; 5. SHORT OAT (*A. brevis*), which has a close panicle turned to one side, the spikelets containing only one or two florets, each floret awned, the grains short. Almost all the varieties of oat in cultivation belong to the first and second of these species. The Naked Oat is cultivated in Austria, but not much esteemed. The Chinese Oat, said to have been brought by the Russians from n. China, is prolific, but the grain is easily shaken out by winds. The Short Oat is cultivated as a grain crop on poor soils at high elevations in mountainous parts of France and Spain, ripening where other kinds do not; it is also cultivated in some parts of Europe as a forage plant.—Besides these, there is another kind of oat, the BRISTLE-POINTED OAT (*A. strigosa*), regarded by some botanists as belonging even to a distinct genus, *Danthonia*, because the lower palea is much prolonged, and, instead of merely being bifid at the point, as in the other oats, is divided into two long teeth, extending into bristles. The panicle is inclined to one side, very little branched; the florets, 2 or 3 in a spikelet, all awned, the grain rather small. This plant is common in corn-fields, is cultivated in many countries, but chiefly on poor soils, and is now scarcely seen as a crop in Scotland, where formerly it was much cultivated. —Not unlike this, but with the panicle spreading equally on all sides, the outer palea merely bifid, and long hairs at the base of the glumes, is the WILD OAT (*A. fatua*), also frequent in corn-fields, and a variety of which is cultivated in some northern countries for meal; but which is usually regarded by farmers as a weed to be extirpated, springing up so abundantly in some districts as to choke crops of better grain. Its awns have much of the hygrometrical property which gains for *A. sterilis*, a species found in s. Europe, the name ANIMAL OAT, because the seeds when ripe and fallen on the ground resemble insects, and move about in an extraordinary manner through the twisting and untwisting of the awns. The

seed of the WILD OAT has been sometimes used instead of an artificial fly for catching trout.—Among species of oat useful not for grain, but as fodder, are the DOWNY OAT-GRASS (*A. pubescens*) and YELLOW OAT-GRASS (*A. flavescens*), both referred by some botanists to the genus *Trisetum*—the short awn being like a middle tooth in the bifid palea—and both natives of Britain, the former growing on light ground and dry hills, especially where the soil is calcareous, the latter on light meadow-lands. —Other species are found in Britain, continental Europe, N. America, Australia, etc. In some parts of the Sahara are bottoms of ravines richly productive of a species of oat-grass (*A. Forskalii*) much relished by camels.

Wild Oat (*Avēna fatua*).

Oats can be grown on a great variety of soils; and, on land having only a small proportion of organic matter, will thrive better than wheat or barley. The yield is much greater on fertile soils than on those partially exhausted; but on too rich land, and on soils deficient in mineral matter, the plants are liable to fall upon the ground and involve the ruin of the crop. In warm localities, oats rapidly degenerate, and it is important frequently to obtain seed from colder regions. In some of the southern states what are called winter oats are cultivated. They are sown in the fall or winter, and are modifications of the ordinary varieties, caused by climatic conditions and the time of sowing, rather than any radical departure from the ordinary type. At the south they yield better crops than the spring sorts, but they are not hardy enough to endure the winters at the north. Considerable quantities of oats are used for food by rich and poor alike, but the grain is used mainly to feed to horses. It is valuable also for sheep and other farm stock. The straw is given to horses and cattle,

and has considerable feeding value. The land for oats should be thoroughly prepared, and the sowing should be done early in the season, so that the plants may make most of their growth before hot weather, and avoid the rust likely to follow late sowing. Two to four bushels of seed per acre are sown broadcast, or one and one-half to two bushels when drilled. Clean seed should be used, and a medium quantity will usually give larger yield than excessive seeding. The cutting should be done when the stalks turn yellow near the ground. If allowed to stand too long, much of the grain will shell in the field, and the straw will be injured for feeding purposes. As after it is cut the grain is discolored by rain, harvesting should, if possible, be done in clear weather. Thorough drying is necessary to prevent heating in the mow or stack.

Oats are rather exempt from the attacks of specific insect enemies; and the means of combating the general cereal enemies are the same as for wheat, barley and other grass and grain insects. They are subject to the attacks of several so-called plant diseases, of which the best known are rust and smut. Since these are less troublesome upon early maturing varieties, these are chosen in regions which seem to be infested. They also have another advantage in that they are less likely to lodge than taller and later growing varieties.

The oat has long been considered one of the most valuable of cereal grains. Beside making an excellent forage, fodder or hay in grass form, and in grain form a standard feed for domestic animals, oats are widely used in human food, particularly in the manufacture of 'breakfast food.' The by-products, such as hulls (the outer covering), bran, middlings, and 'oat dust' are largely sold to stockmen for mixing with other feeds. The whole grain has the following average composition: Nitrogen-free extract, 59.7; protein, 11.8; water, 11.0; crude fibre, 9.5; fat, 5.0; ash, 3.0. Since analyses have failed to reveal the presence of a supposedly stimulating principle called 'avenin,' chemists and other investigators have concluded that such a principle does not exist.

In 1906 the production of oats in the United States on 30,958,978 acres amounted to 964,904,522 bushels, valued at $306,292,978, the average yield per acre being 31.2 bushels and the farm price per bushel 31.7 cents. The most productive states were Iowa 140,777,000 bushels; Illinois 107,763,500 bushels; Wisconsin 91,630,000 bushels; Nebraska 72,275,000 bushels; Minnesota 72,011,160 bushels; Indiana 50,196,000 bushels; Ohio 48,280,000 bushels; South Dakota 46,410,000 bushels; Michigan 43,747,500 bushels; North Dakota 40,485,608 bushels; New York 40,233,784 bushels; Texas 31,822,512 bushels; Pennsylvania 31,816,496 bushels; Kansas 24,780,000 bushels; Missouri 14,685,503 bushels; and Oklahoma 12,040,000 bushels; all other states producing less than 10,000,000 bushels each.

OATES, *ōts* (*alias* AMBROSE), TITUS: a. 1650–1705, July 13; son of a ribbon weaver, who, according to one account, having become first an Anabaptist minister in the time of Cromwell, took orders and a benefice in the English Church after the Restoration. Titus appears to have been born in London. He was a pupil of Merchant Taylor's School, whence he passed to Trinity College, Cambridge, took orders, and received a small living from the Duke of Norfolk. This position, however, he forfeited, in consequence of a malicious prosecution set on foot by him, in which he narrowly escaped conviction for perjury; and having been afterward appointed to the chaplaincy of one of the king's ships, he was expelled from it on a charge still more disgraceful. In this extremity, he conformed to the Rom. Cath. Church, and was admitted as a scholar of the Jesuits' college at Valladolid; but was expelled for misconduct, after a trial of a few months. He was again received by the Jesuits, on his earnest protestations of repentance, at St. Omer, where he was again unsuccessful, and was finally dismissed by them early in 1678. He now, as a mere vagabond adventurer, set himself to live by his wits, in the evil exercise of which he devised, about this time, the atrocious scheme with which his name is identified in history. Just then, great excitement and alarm pervaded the Prot. party in England. It was well known that Charles was at heart a Rom. Cath.; and his brother, the Duke of York, afterward James II., was an active and avowed zealot on the same side. The growing confidence of the Rom. Catholics was unconcealed; and, with or without instant reason, the cry so often since heard arose, and was everywhere re-echoed, that the 'Protestant religion was in danger.' In this fevered state of general feeling, O. saw his opportunity. He communicated to the authorities the details of a pretended plot—the figment of his own brain—whose main elements were a rising of the Rom. Cath. party, a general massacre of Protestants, the burning of London, the assassination of the king, and the invasion of Ireland by a French army. In some of its items, the fiction was devised with considerable ingenuity to catch the popular belief. By strange coincidence, moreover, there just then occurred a series of events which seemed conclusively to attest its genuineness. A correspondence, the object of which was the propagation of the Rom. Cath. religion, came to light, between the sec. of the Duke of York and Père La Chaise, confessor and confidant of Louis XIV. Danby, the prime minister, it also appeared, had been busy with intrigues in the same quarter. Finally, Godfrey, the zealous Prot. magistrate through whom first publicity was given to 'the plot,' was found mysteriously murdered. After this, could reasonable doubt exist? Was not the English St. Bartholomew already begun? All London went wild with fear and rage; and it seemed at one time likely that a massacre of Rom. Catholics would be substituted for the dreaded

extermination of the Protestants. The parliament, which might have done something to allay the excitement, was itself swept headlong away by it. The king alone—whose life was threatened, but who, dissolute and indolent as he was, wanted neither courage nor shrewdness—much to his honor, scornfully insisted that the plot was merely some insane delusion, and tried, so far

Oates in the Pillory.—From a Contemporary Print.

as he could, to control the excesses which followed. Probably his interference was of the characteristically easy, *insouciant* kind; in any case, it did not avail. The story of O. was universally believed; and he became the hero of the day. A pension of £600 (or £900) a year was granted him; a suite of apartments in the palace at Whitehall was set apart for his use; and wherever he

went, the Prot. public wildly cheered him as their savior. With the aid of a set of suborned ruffians, only one degree less foul than himself, convictions of his victims were readily obtained, judges and juries vying with each other in their unquestioning reception, in evidence, of the grossest and most manifest perjuries; and many innocent Rom. Cath. gentlemen died the death of traitors at the block. Over the space of two years, the base success of O. was signalized by a series of judicial murders. Naturally, however, as reason resumed its sway, doubts began to be felt; and on the execution of a venerable and respected nobleman, Viscount Stafford, public suspicion awoke with a strong shock of pity and remorse, and a violent reaction set in. It was only, however, on the accession of James II., 1685, that retribution overtook the malefactor. Active steps against him were then taken. He was tried before the court of king's bench, convicted of perjury, and sentenced to be pilloried, whipped at the cart's tail, and afterward imprisoned for life. The leniency of the sentence would be surprising if not explained: it was intended that the severity of the first two items of punishment should render the last one superfluous, and that the wretch should die under the lash of the executioner. But the hide of O. was beyond calculation tough; and horribly lacerated, yet living, his carcass was conveyed to the prison, from which it was meant never more to issue. Very strangely, however, the next turn of the political wheel brought new fortune to the monster. When the revolution of 1688, with the flight of James, placed William on the throne, the Prot. influence triumphed once more; and in the outburst of enthusiasm which ensued, what more natural than that the fickle public should glorify O. as a Prot. martyr? He appealed to parliament: the commons annulled his sentence; the lords, though admitting its injustice, confirmed it by a vote of 35 to 23; and the matter was settled by a royal pardon, with a pension of £300 a year. He passed his 17 remaining years in obscurity.

OATH.

OATH, n. *ōth* [AS. *ath;* Goth. *aïth;* Ger. *eid,* an oath] : a solemn declaration of truth-telling confirmed by an appeal to God as witness; a promise to do something confirmed by a solemn appeal to God: also, a profane ejaculation. FALSE OATH, a falsehood intensified in guilt by the appeal made to God.—*Oath,* in the religious use of the word, may be defined an expressed or implied calling upon the Almighty to witness the truth of an asseveration or the good faith of a promise; with which is ordinarily conjoined an imprecation of his vengeance, or a renunciation of his favor, in case the asseveration should be false or the promise be broken. This practice has prevailed, in some form, in almost all the religions of the ancient and the modern world. It supposes, however, a belief of the existence of a provident Supreme Being, in order to its moral efficacy as a safeguard of truth. Among the Jews are instances in Gen. xiv. 22, xxi. 24, xlvii. 31, l. 5, confirmed even by the example of God himself, Num. xiv. 28, Jer. xliv. 26, Is. lxii. 8. It was strictly forbidden to the Jews to swear by false gods (Amos viii. 14, Jer. xii. 16). The form of oath was probably variable—either a direct adjuration, as 'The Lord liveth,' or an imprecation, 'The Lord do so to me;' but in all cases the strongest denunciations are held out against the false swearer (Ex. xx. 7, Lev. xix. 12). Oaths were employed, both judicially and extrajudicially, by the ancient Egyptians, Assyrians, Medes, and Persians, as well as by the Greeks and Romans. The forms were very various—one of the most solemn consisting in the act of placing the hand on the altar of the deity invoked as witness. In the judicial proceedings of the Greeks and Romans, oaths were employed, but not universally; and in examples of their extrajudicial use the literatures of both abound. In the Christian dispensation, the solemnity of an oath is greatly enhanced by the elevated idea of the holiness, power, wisdom, and infinite perfection of the living God whom Christ reveals.

The lawfulness and fitness of the practice, under circumstances of due solemnity, are commonly recognized by Christians. Some communions, of which the most remarkable are the Moravians and the Society of Friends, applying literally the words of Christ (Matt. v. 34), regard all oaths as unlawful. But other communions generally restrict this prohibition to ordinary and private discourse; finding, in Rom. i. 9, II Cor. xi. 11, Gal. i. 20, Phil. i. 8, and I Thess. ii. 5, full warrant for the lawfulness of oaths in judicial and other solemn use. From some passages of the Fathers, it might seem that they shared the difficulties of the Quakers and Moravians on the subject of the lawfulness of swearing; but these Fathers for the most part referred to the oaths required of Christians by the pagans, which generally involved a recognition of particular pagan divinities; and they condemned these pagan oaths, rather as involving or even directly containing a profession of the popular

paganism, than as unlawful in themselves as oaths. The Christians of the later ages may perhaps be said to have multiplied in an opposite degree the occasions of oaths; especially of what were called 'purgatorial' oaths, in which a party charged with a crime justified himself by swearing his innocence. The common instrument of attestation on O. was the Bible or some portion of it: but oaths were sometimes sworn on the relics of saints, or other sacred objects; sometimes simply by raising the hand to heaven, or by laying it upon the breast or the head. In canonical processes, the O. was often administered to the party kneeling. The forms varied very much, the most general being that which the English O. still retains (*Sic me Deus adjuvet*). Divines commonly state, in order to the lawfulness of an O., three conditions requisite (founded on Jer. iv. 2)—viz., *truth*, *justice*, and *judgment* —that is to say (1), that the asseveration, if the O. be assertive, shall be *true;* and that the promise, if the O. be promissory, shall be made and kept *in good faith;* (2), that the thing promised shall be objectively lawful and good; (3), that the O. shall be sworn not without due discretion and deliberation, and not without satisfactory reasons founded on necessity or at least on grave and manifest utility.

The Mohammedans do not employ oaths in their judicial proceedings; but they regard deliberate perjury, even when extrajudicially committed, as sinful and deserving of God's vengeance. For this, however, they require that the O. should be an express adjuration of God himself by some one of his well-known holy names; that the jurant should be of full age and intelligence; and that the O. should be sworn deliberately and with the intention of swearing.

OATH, in Law: a solemn asseveration before an authorized officer in some recognized form and mode, made with a reverent appeal to Deity or to some sacred or venerated object to witness the words of the party, and for the purpose of insuring the truth of a statement or the faithful performance of a duty. An oath to witness the truth of a statement made or to be made should also possess the additional force of subjecting the party to punishment as for a crime if the statement be false. Nearly all the great public offices of the state in civilized countries can be filled by persons only who are willing to take an O. before acting in such office. The office of king or queen of Great Britain requires a Coronation Oath (q.v.). Members of parliament also require to take the oath of fidelity and true allegiance, and promising to maintain the succession. Quakers and others may make an affirmation to the same effect. In 1868, 9, and 71, great changes were made as to oaths in Britain. In the United States, all officials of state or national governments who hold functions of responsibility are generally required to take O. at entrance on their offices—usually of obedience to the constitution and laws, and of faithfulness to the duties in-

volved. Among ancient armies, the taking of the military O. of fidelity and obedience was a very solemn procedure. A whole corps, sometimes an entire army, took the O. together. In modern armies, the multiplication of the means of discipline has reduced the O. to little more than a form.

Important oaths affecting the general public are those required to secure and enforce the truth from witnesses in courts of justice. Jurymen take an O., which is read to the juror, to this effect—'You shall well and truly try the issue between the parties, and a true verdict give, according to the law and evidence, so help you God;' and in the old (and a still common) practice the juror kisses the New Testament. A witness called to give evidence must be first sworn in a similar manner, the words being to this effect—'The evidence you shall give shall be the truth, the whole truth, and nothing but the truth, so help you God.' Hence, a witness must have sufficient understanding to know the nature and obligations of an oath; and, on this ground, young children are incompetent to be witnesses. The usual practice is, for the witness after hearing the oath repeated by the officer of court, to kiss the four gospels by way of assent: but the details of formality vary in different countries, and in different states of the Union, and even according to the conscience or preference of individuals: thus, in Scotland, the witness repeats similar words after the judge, standing and holding up his right hand, 'swearing by Almighty God, as he shall answer to God at the Great Day of Judgment,' but without kissing any book. Individuals who so prefer are sworn, in the United States, not with kissing any book, but 'by the Living God'—a solemn and simple form. Jews are sworn on the Pentateuch, keeping on their hats, and the oath ends with the words, 'so help you Jehovah.' A Mohammedan is sworn on the Koran; a Chinese witness has been sworn by kneeling and breaking a china saucer against the witness-box. Thus, the mere form of taking the oath is immaterial; the witness being allowed to take it in whatever form he considers most binding upon his own conscience.

The policy of insisting on the religious formalities attending the taking of an O. has been much discussed of late years in Great Britain and the United States; and concessions have from time to time been made by the laws in both countries, in the direction of greater latitude. Till comparatively recent years, atheists and persons who admitted that they had no religious belief were excluded from giving evidence in courts of justice—which exclusion occasionally tended to frustration of justice. The objection of Quakers, Moravians, and some other religious sects to taking the O. was long respected, as not being fundamentally at variance with a due sense of religious feeling; hence they were allowed by statute to take an affirmation instead of the oath. A further concession was made to those who, not being Quakers, yet

refused to take the O. from sincere conscientious motives, such also being allowed to affirm. Later, reference to religious tests was excluded where the judge was satisfied that the taking of the O. would have no binding effect on the conscience of the person called to give evidence—such person being allowed to make an affirmation, in which he 'solemnly promises and declares that the evidence given by him to the court shall be the truth, the whole truth, and nothing but the truth, as he shall answer under the pains and penalties of perjury. In Great Britain, the right of a member of parliament to affirm instead of taking the usual oath was brought conspicuously before the British public 1880, when Mr. Bradlaugh, member for Northampton, refused to take the O., on the ground that the religious expressions made use of therein had no meaning for him. After a series of debates, a motion passed the house that Mr. Bradlaugh be allowed to make an affirmation; which he thereupon did, and took his seat. It was, however, decided by the law-courts that he was not entitled to make affirmation in this case; and though he afterward expressed his desire to take the O., a vote of the house declined to permit him. In 1883 the govt. brought in a bill permitting the affirmation in such cases, but was defeated by a small majority. In the new parliament, 1886, Mr. Bradlaugh did take the oath. In this country, a declared atheist must make an affirmation as a witness; and to testimony given on such affirmation the law of perjury applies, as to testimony on oath. In administration of the O., the mode is adopted which is most binding on the conscience of the witness.

When a witness, after being duly sworn, gives false evidence in a court of justice or in a judical proceeding, and his evidence so falsely given is material, he commits the crime of Perjury (q.v.). As a general rule, false swearing cannot be punished except the false statement has been made in some judicial proceeding or in an affidavit authorized by law or used as evidence, to establish some issue, claim or demand.

Unlawful oaths generally mean oaths of treasonable character taken by members of secret and illegal societies, or oaths binding to the commission of murder or other unlawful act. OATH OF CALUMNY, in Scotch law, oath taken by a party, at the instance of his opponent, that the allegations were well founded. OATHS OF VERITY AND CREDULITY are oaths that a debt or claim is well founded.

OAXA'CA: see OAJACA.

OB, *ŏb* [L. *ob.* in front, before, against]: a prefix meaning 'in the way of; against; towards,' as in *ob*viate; *ob* becomes *oc* before *c*, as in *oc*casion; *of* before *f*, as in *of*fend; *o* before m, as in *o*mit; and *op* before *p*, as in *op*pose: in *bot.*, *ob* means 'reversed'—thus: 'cordate' means heart-shaped, with the attachment at the broad end; '*ob*cordate' means heart-shaped, but with the attachment at the narrow end.

OB, *ōb*, or OBI, *ō′bē:* great river of w. Siberia, whose two branches, the Bia and the Katune or Katunga, both have their origin in the Altai Mts., within the frontier of the Chinese dominions, about lat. 49° n. and long. 90° e. These branches, flowing n.w., unite to form the Ob at the town of Biisk, in lat. 52° 30′ n., long. 85° e. By a winding course, generally n.w., the Ob reaches the meridian of 75° e., when it turns w. and maintains that direction to its confluence with the Irtish, the greatest of its tributaries. It then flows n.w., n., and n.e., to its mouth in the Gulf of Ob, which it reaches after a course of 3,000 m. Its chief affluents on the right are the Tom—a swifter stream than the Ob, 400 m. in length, and navigable for the last 280 m. from the beginning of May till July—the Tchulim, and the Ket. The principal affluent on the left is the Irtish, which, rising within the frontier of the Chinese territories, traverses the Altai Mts., and, after a course longer than that of the Ob itself, joins that river 250 m. below Tobolsk. The trade of the Irtish, of which the centre is Tobolsk, is important. The principal towns on the banks of the Ob are Narim, Surgut, Berezov, and Obdorsk.—The Gulf of Ob is a great inlet of the Arctic Ocean, 450 m. long by about 100 m. wide. At present, only a few steamers ply on the great water-system of the Ob; but that system, communicating as it does between Siberia, the Chinese territories, and European Russia, is, without doubt, destined to become a great commercial thoroughfare. The explorations of Prof. Nordenskjöld, and especially the tentative voyages of Capt. Wiggins 1874 and 76, from Dundee through the Kara Sea to the Gulf of Ob, have amply proved the feasibility of this direct route. This river is very rich in fish. Below its junction with the Irtish, it divides itself into several parallel streams; and in the flood season it inundates great tracts of country, and presents the appearance of a waste of waters, its desolate uniformity broken only by the occasional tree-tops that rise above the surface. At Obdorsk, about 20 m. s. of the s. border of the Gulf of Ob, the river freezes in the middle of Oct., and breaks up about the middle of May.

OBADIAH, *ō-ba-dī′ah:* fourth of the 'minor prophets' of the Old Testament, regarding whom absolutely nothing is known. His book or 'vision'—the shortest of the Jewish Scriptures—appears, from internal evidence, to have been composed after the destruction of Jerusalem by the Chaldæans, B.C. 588, and consists of two parts. The first is a prophecy of the downfall of Edom. The second foretells the future redemption and glory of the house of Jacob, in which Edom—for his unbrotherly conduct—shall not share, but, on the contrary, be burned up as 'stubble.'

OBAN, n. *ō′băn* [Japanese]: principal gold coin of Japan, value about $19.84.

OBAN, *ō′băn:* parliamentary burgh and seaport, Argyleshire, Scotland, on the bay of O., 20 m. (in direct line) n.w. of Inveraray. The bay is protected from every wind by the island of Kerrera, on the w., and by the high shores of the mainland, and is overlooked on the n. by the picturesque ruins of Dunolly Castle. It is 12 to 24 fathoms deep, and, though the girdle of hills that seems to surround it gives it the appearance of a lake, it is easily accessible, and could afford anchorage to 300 sail. O. is the great rendezvous for tourists in the w. Highlands. The burgh now contains a number of churches, several hotels and inns, schools, banks, etc. Within three m. of O. is Dunstaffnage Castle, said to have been the seat of the Scottish monarchy before its transference to Scone. The Stone of Destiny, which now supports the coronation chair in Westminster Abbey, and was carried thither from Scone by Edward I., was brought from Dunstaffnage Castle. A railway from Callander, connecting O. with Edinburgh and Glasgow, was opened 1880. Pop. of O. (one of the Ayr group of parliamentary burghs) 5,400.

OBCOMPRESSED, a. *ŏb′kŏm-prĕst′* [L. *ob*, reversed, and Eng. *compressed*]: in *bot.*, flattened in front and behind, not laterally.

OBCONICAL, a. *ŏb-kŏn′ĭ-kăl* [L. *ob*, reversed, and Eng. *conical*]: conical, but with the apex downward.

OBCORDATE, a. *ŏb-kŏr′dāt* [L. *ob*, reversed, and *cor*, the heart]: heart-shaped, but inverted.

OBDURATE, a. *ŏb′dū-rāt* [L. *obduratus*, hardened—from *ob*, against; *durus*, hard]: hardened in heart; stubborn; callous; obstinate in wickedness. OB′DURATELY, ad. *-lĭ*. OBDURACY, n. *ŏb′dū-ră-sĭ*, or OB′DURATENESS, n. *-nĕs*, the state of being obdurate; invincible hardness of heart; obstinacy.—SYN. of 'obdurate': hardened; obstinate; pertinacious; contumacious; hard; firm; unbending; inflexible; unyielding; impenitent; unfeeling; unsusceptible; insensible; in *OE.*, harsh; rugged.

O′BEAH, or O′BEA: see OBI.

OBE′DIENCE, in Canon Law: the duty by which the various gradations in ecclesiastical organization are held subject, in all things consistent with the law of God or of the church, to the several superiors placed immediately above each, respectively, in the hierarchical scale. Thus priests and inferior clergy owe canonical O. to the bishop, and priests are bound thereto by a solemn promise administered at ordination. The bishop anciently took a similar oath to the metropolitan; but by the modern law, the jurisdiction of the metropolitan is confined to the occasions of his holding a visitation or presiding in the provincial synod. Bishops, by the present law of the Rom. Cath. Church, take an oath of O. to the pope: this O., however, is limited strictly by the canons, and is held to bind only in things consistent with the Divine and natural law. In ecclesiastical history, the word O. has a special signification,

and is applied to the several parties in the church which, during the great Western Schism (q.v.), adhered to the rival popes. Thus we read of 'the Roman Obedience,' which included all who recognized the pope chosen at Rome, and 'the Avignon Obedience,' which meant the supporters of the Avignon pope. So, again, historians speak of 'the Obedience of Gregory XII.' and 'the Obedience of Benedict XIII.,' etc. Applied to the monastic institute, O. means the voluntary submission which all members of religious orders vow, at their religious profession, to their immediate superiors, of whatever grade, in the order, as well as to the superior-general, and still more to the rules and constitutions of the order. This forms, in all orders, one of the essential vows. It is, however, expressly confined to lawful things; and though it is held that a superior can command certain things under pain of sin, yet Rom. Catholics repudiate the notion that the command of a superior can render lawful, much less good, a thing which is, of its own nature or by the law of God, sinful or bad. The name O. is sometimes given to the written precept or other formal instrument by which a superior in a religious order communicates to one of his subjects any special precept or instruction—e.g., to undertake a certain office, to proceed on a particular mission, to relinquish a certain appointment, etc. The instruction is called an O., because it is held to bind in virtue of religious obedience.

OBEDIENT, a. *ō-bē'dĭ-ĕnt* [OF. *obedient*—from L. *obedien'tem*, dutiful: It. *obediente* (see OBEY)]: compliant with law or duty; dutiful; willing to obey; submissive to constraint or control. OBE'DIENTLY, ad. *-lĭ*. OBE'DIENCE, n. *-ĕns* [F. *obédience*—from L. *obedien'tĭă*]: a willing compliance with what is required; submission to authority. OBE'DIEN'TIAL, a. *-ĕn'shăl*, complying with commands. PASSIVE OBEDIENCE, in *Eng. hist.*, the unqualified obedience which, according to some, is due from subjects to the sovereign.—SYN. of 'obedient': yielding; compliant; submissive; respectful; observant; regardful.

OBEID', or EL OBEID': see IL OBEID.

O'BEIRNE, *o-bērn'*, THOMAS LEWIS, D.D.: 1748–1823, Feb. 15; b. Longford co., Ireland. He graduated from a Jesuit college in France, intending to enter the Rom. Cath. priesthood, but changed his religious views and entered the ministry of the Church of England. He was chaplain to Lord Howe's expedition to America, at the beginning of the revolution, officiated in St. Paul's Church, New York, 1776, held a political position in Ireland 1782, became bp. of Ossory 1796, and two years later was placed over the see of Meath. He published three vols. of sermons, a poem on *The Crucifixion*, various political tracts, and a *Vindication* of the course pursued in America by his friends and patrons, Gen. Sir William Howe and Lord Admiral Howe. He died in County Meath, Ireland.

OBEISANCE, n. *ō-bā'sănce* [OF. *obeisance;* F. *obéissance*, obedience—from L. *obedĭen'tĭă*, obedience; *obediens*, dutiful—from *obēdĭō*, I hearken or listen to]: a bow; a movement of the body expressive of deference.

OBELISK, n. *ŏb ĕ-lĭsk* [F. *obélisque*—from L. *obĕliscus;* Gr. *obĕlīskos*, a spit or broach, an obelisk (see OBELUS)]: four-sided or prismatic monument of stone and like materials, gradually tapering as it rises, and assuming at the top a pyramidal or pointed form. The name is given also to a reference mark in printing, thus †, called also a dagger. *Note.*—A connection has been suggested of *obelisk* with anc. Egyptian *ob* or *aub*, a serpent; also with an obsolete Gael. *ob*, the serpent; Gael. *leigh*, a stone, a sacred stone.—Rude stone pillars were in many lands not only venerated, but worshipped, in prehistoric times, either as the 'powers of nature,' or in 'sun-worship,' 'serpent-worship,' or 'arkite-worship'—see Dr. C. Mackay. These pillars, called *tekhen*, were placed upon bases before gateways of the principal temples in Egypt, one on each side of the door. They served in Egyptian art for the same purposes as the stelæ of the Greeks and the columns of the Romans, and appear to have been erected to record the honors or triumphs of the monarch. They have four faces, are cut out of one piece, and are broader at the base than at the top, at a short distance from which the sides form the base of a pyramidion, in which the obelisk terminates. They were placed upon a cubical base of the same material, which slightly surpassed the breadth of their base. Each side of the obelisks at the base measures $\frac{1}{10}$ of the height of the shaft, from the base-line to that where the cap, or pyramidion, commences. The cap is also $\frac{1}{10}$ of the same height. Their sides are slightly concave, to increase their apparent height. Their height varies from more than 100 ft. to a few inches, the tallest known being that of Karnac, 105 ft. 7 inches. The sides are generally sculptured with hieroglyphs and representations, recording the names and titles of kings, generally in one line of deeply cut hieroglyphs down each side. The pyramid of obelisks was sometimes decorated with subjects. The mode by which they were made appears to have been to hew them first in the rough out of a solid piece in the quarries, and one unfinished specimen thus prepared still remains in the quarries of Syene. They were transported down the Nile during the inundation, on rafts, to the spot where they were intended to be placed, and raised from their horizontal position by inclined planes, aided by machinery. Some obelisks, before their erection, had their pyramid capped with bronze gilded, or gold, the marks of such covering still being evident on their surfaces. Under the Roman empire, they were raised by pulleys and heavy tackle. The difficulty of erecting the fallen ones in the ages of the renaissance, as also the mechanical appliances for lowering from its original site the obelisk of Luxor 1831, and erecting it in the Place de la Concorde, Paris, 1833, by Le Bas, show the difficul-

CLEOPATRA'S NEEDLE, CENTRAL PARK, NEW YORK CITY.

ties overcome by the ancients. The use of obelisks is as old as the appearance of art itself in Egypt; these grand, simple, and geometric forms being used in the 4th dynasty, and continued till the time of the Romans. Their object is enveloped in obscurity. At the time of the 18th dynasty, it appears that religious ceremonies and oblations were offered to the obelisks. Their sepulchral use is evinced by their discovery in the tombs of the 4th dynasty and by the vignettes of early papyri.

No large obelisk is older than that of Matarieh or Heliopolis, erected by Osortesen I. about B.C. 1900; and that of Beggig or Crocodilopolis is, in reality, only a stele. Thothmes I. placed two of large size before the granite sanctuary of Karnac, and his daughter Hatasu two others more than 90 ft. high before the second propylæum. Additional sculptures were made on these obelisks by Sethos I., who restored them. Thothmes III. appears to have erected many obelisks. The oldest is that of the Atmeilan or Hippodrome of Constantinople. Two others, which formerly stood at Heliopolis, were subsequently re-erected by Rameses II. at Alexandria, and have been popularly known as Cleopatra's Needles. One of these, which long lay prostrate, was after an adventurous voyage brought to London 1878, and erected on the Thames Embankment. The other, 68 ft. in height, presented by the khedive to the United States, was brought to New York 1881, under superintendence of Commander H. H. Gorringe, U. S. N., who fitted a vessel and machinery especially for its transport. It was set up in Central Park, the expense of its removal and erection being defrayed by William H. Vanderbilt of New York. The address at its public opening was by William M. Evarts. The four pyramid-tops are covered with hieroglyphics, of which those on three faces are legible, dating from the time of Thothmes III. In the middle spaces left vacant by Thothmes III., one of his descendants, Rameses II., 300 years afterward, inscribed his own name and titles. This monolith, whose inscriptions date earlier than 1,500 years before Christ, must nave been looked on by Moses, and had become ancient, and its significance misty and doubtful, in the time of Augustus Cæsar. The highest of all obelisks, that of St. John of the Lateran, appears to have been removed from Thebes, and set up by Thothmes IV. A small obelisk of Amenophis II., said to have been found in the Thebaïd, apparently from Elephantine, is in the collection of the Duke of Northumberland at Sion. Sethos I. commenced the Flaminian obelisk, subsequently completed by Rameses II., and placed at the temple of Heliopolis. It was removed to Rome by Constantius, and found 16 ft. under the surface in the pontificate of Gregory XIII., and erected in that of Sextus V. by the architect Fontana. The other obelisks of Rameses II. are: the one at the Luxor quarter of Thebes, the companion of which was removed to the Place de la Concorde at Paris 1833; the two obelisks of San or Tanis;

that of the Boboli gardens of Florence, transported from the Circus of Flora at Rome; the obelisk of the Rotonda at Rome, erected by Clement XII., 1711; and that of the Villa Mattei, which decorated the Ara Cœli of the Capitol. A fragment of another obelisk was in the Collegio Romano. No obelisks are known of other monarchs till the 26th dynasty. That of the Monte Citorio at Rome, erected by Psammetichus II. at Heliopolis, was transported by Augustus to the Campus Martius, having been exhumed 1748. Two other obelisks of small size, made of black basalt, dedicated by Nekhtherhebi or Nectanebes II. at Hermopolis, commonly known as the obelisks of Cairo, are in the British Museum. Ptolemy Philadelphus is said to have erected in the Arsinoeum at Alexandria a plain obelisk of 80 cubits, cut in the quarries by Nectabis. It was set up by the architect Satyrus. Two obelisks, erected by Ptolemy Euergetes II. and his wife Cleopatra, stood before the temple of Philæ, one of which was removed to Corfe Castle. The so-called Pamphiliano obelisk at Rome, erected by E. Bernin 1651, in the Piazza Navona, under the pontificate of Innocent X., was removed from the Circus of Maxentius, having, as the hieroglyphical legends testify, been originally erected by Domitian before the Serapeum at Rome. The last of the Roman obelisks was the Barberini, found 1633 on the site of the Circus of Aurelian, and finally erected 1822 on the Monte Pincio. It was placed by Emperor Hadrian before the mausoleum or cenotaph either of himself or Antinous, A.D. 132–138. Barbarous hieroglyphs, found on the Sallustian obelisk, are copied from the Flaminian obelisk. It is supposed to have been transported to Rome (unadorned with hieroglyphs) by Sallustius Crispus, prefect of Numidia, and to have been set up in the gardens of Sallust in the reign of Vespasian. It was erected by Antinori, 1789, before the Church of Trinita del Monte. It has been seen how, on the renaissance of the arts, the obelisks were restored and applied to the embellishments of modern Rome, either as columns in the centre of piazzas or squares, or else as the ornaments of fountains; one obelisk being set up alone in the centre of the piazzas and places of Italy and France, while in antiquity they always stood in pairs before the pylons.

Two small obelisks, and the apex of a third, have been found in Assyria, in shape of truncated prisms, the apexes step-shaped. The most interesting is that of the n.w. palace of Nimrúd, of black marble, 5 ft. 9 in. high. Each side has five compartments of bas-reliefs, representing the tributes and offerings made to the Shalmaneser. It is covered with a cuneiform inscription, recording the annals of the king's reign, from his 1st to his 31st year. On it is represented the tribute of Jehu, King of Israel. A second obelisk, of white marble, measures 8 ft. 2 inches high, is covered with bas-reliefs, representing scenes of war and tributes, winding round it like those of a Roman triumphal column. On it is an

inscription of Shamas-Pul. The broken apex of a third has a dedication from Ashur-izir-'pul II. An obelisk of Semiramis at Babylon is mentioned by Diodorus, and another of Aricarus was interpreted by Democritus. Under the Roman empire, obelisks were used as gnomons, placed in the public spaces, or erected in the *spina* of the *circi*. The first removal of obelisks to Rome was in the reign of Augustus, who placed in the circus one said to have been erected originally in the reign of Semenpserteus, 85¼ ft. high; and another, 9 ft. less, in the Campus Martius: he had the latter adjusted as a gnomon by the mathematician Facundus Novus. A third obelisk was erected in the Circus of Caligula and Nero in the Vatican, and originally dedicated to the sun by Nuncoreus, son of Sesostris, on the recovery of his sight. Two other small obelisks, which decorated the mausoleum of Augustus, and were erected by Claudius

Obelisks in Front of a Temple.

or Vespasian and his sons, have been found. Other obelisks are known to have been removed by Constantius, A.D. 354. P. Victor, in his description of the quarters of ancient Rome, reckons 6 of the largest size and 42 others. The Romans added to them brazen spheres and other decorations. Some were removed to Constantinople by Theodosius the younger and Valentinian, A.D. 390. The translation of the inscription of one of the Roman obelisks, made by a Greek or Egyptian named Hermapion, has been preserved by Ammianus Marcellinus.—Kircher, *Œdipus Ægyptiacus* (III. Rom. 1652–54); Zoega, *De Origine et Usu Obeliscorum* (1797); Cipriani, *Sui Dodici Obelisci di Roma* (1823); L'Hôte, *Notice Historique sur les Obélisques Egyptiens* (1836); Birch, *Notes upon Obelisks* (1853); Sir Erasmus Wilson's *Cleopatra's Needle* (1878); Lieut. Gorringe's *Egyptian Obelisks* (1882).

OBELUS, n. *ŏb′ĕ-lŭs* [L. *obĕlus;* Gr. *obĕlos*, a spit, a mark shaped like a spit placed opposite suspected passages in a book] : in *anc. MSS.*, the mark (—) or (÷) inserted, particularly in those of the Septuagint, to indicate that the passage so marked is not found in the Hebrew; the line thus (—) in modern writing is employed to mark the place of a break in the sense where it is suspended, or when some awkward grammatical transition is made, but is often used instead of a (;) or (:).

OBER-AMMERGAU, *ō′bĕr-ăm′mĕr-gow :* village in the valley of the Ammer, among the mountains of upper Bavaria. Pop. about 1,500. The people are employed mainly in toy-making, and in carving crucifixes, rosaries, and images of saints. See MYSTERIES AND MIRACLE-PLAYS.

OBERLIN, *ō′bĕr-lĭn:* village in Russia tp., Lorain co., O.; on the Lake Shore and Michigan Southern railroad; 34 m. s.w. of Cleveland, 22 m. e. of Norwalk. It is a quiet, pleasant, and well-ordered village, known as the seat of Oberlin College (q.v.), and also has good public and business schools, etc. There are several manufactories, including saw, planing, and flour mills, a carriage factory, and a machine-shop. Pop. (1900) 4,082; (1910) 4,365.

OBERLIN, *ō′bĕr-lĭn*, Ger. *ō bĕr-lēn*, JOHANN FRIEDRICH: 1740, Aug. 31—1826, June 1; b. Strasburg: distinguished for active benevolence and usefulness. He studied theol. at Strasburg, and 1766 became Prot. pastor of Waldbach, in the Ban de la Roche or Steinthal, a wild mountainous district of Alsace. Here he spent the remainder of his life, combining an affectionate diligence in the ordinary duties of the pastorate with wise and earnest endeavors for the education and general prosperity of the people. The district had suffered terribly in the Thirty Years' War, and the scanty population which remained was sunk in poverty and ignorance. O. introduced better methods of cultivating the soil, and various branches of manufacture: he incited the peasantry to construct roads and bridges, setting the example by working on them with his own hands. He founded an itinerant library, and established infant schools—the first on record. The population, scarcely 500 when he entered on his labors, had increased to 3,000 at the close of the century. Animated in all his actions by the most pure and disinterested piety, he carried his moral supervision over his child-like parishioners so far beyond ordinary bounds that he kept a register of their moral character, and searched with the minuteness, though not the motives, of an inquisitor, into the least important details of their private life. O. was ably assisted in his labors, especially for education, by his pious housekeeper, Luise Schepler, who survived her master 11 years. Notwithstanding the humble sphere in which his days were spent, his fame as philan-

thropist has extended over the world, and his example has stimulated and guided many. See *Brief Memorials of Oberlin,* by the Rev. T. Sims, M.A. (London 1830), *Memoirs of Oberlin* (1852), biography by Bodemann (1868), and that by Spach (Paris 1866).

OBERLIN COLLEGE: institution at Oberlin, O., 34 m. s.w. of Cleveland; named after Johann Friedrich Oberlin, German philanthropist; founded 1833, under evangelical Congl. auspices, and in its origin was associated with the anti-slavery movement, admitting students irrespective of color; it was also a pioneer in collegiate co-education of the sexes; but its strongest features were religious zeal and economic simplicity of life. There are now 11 buildings, the more recent having architectural attractiveness. There are: a chapel, with seats for 1,200; Council Hall, theological; the Cabinet (museum), French, and Society halls; Peters Hall, for the dept. of philosophy and the arts; Spear Library; Stewart Hall and Sturgis Hall, for young women, with dormitories for them named Talcott Hall and Baldwin Cottage. The theological dept. has a classical and an English course, and a Slavic branch to train missionaries for work in the United States. The dept. of philosophy and the arts has classical, philosophic, and literary courses; the preparatory dept. has an English course and a four years' classical. There is a school of drawing. The Conservatory of Music is noted for its success, and has a fine building, the gift of Dr. Warner of New York. The college has a faculty numbering usually 84 professors and instructors, and an annual enrollment of about 1,500 students, three-fifths of whom generally are women. The library contains over 70,000 volumes and 100,000 pamphlets. The grounds and buildings are valued at $660,000; the scientific apparatus and other equipment $57,000; and the productive fund is $1,068,800. The annual income from tuitions and fees is about $90,000, from the productive funds $50,000. The benefactions were $154,700, and the total income from all sources $210,143 in 1901. The spirit of the college was largely infused with that of the Rev. Charles G. Finney (see OBERLIN THEOLOGY), for many years its president; a goodly number of its professors have been men of wide reputation; and multitudes of its graduates have carried its devout influence and its earnest reformatory spirit everywhere. It is a centre of theological literature since the transference to it of the *Bibliotheca Sacra* from Andover; the editor-in-chief, Prof. G. F. Wright, is well known also as a scientific investigator and author.

OBERLIN THEOLOGY: term applied especially to the doctrines of the late Rev. Charles G. Finney, for many years pres. of Oberlin Coll., Ohio. These are set forth in his *Lectures on Systematic Theology, embracing Lectures on Moral Government, together with Atonement, Moral and Physical Depravity, Regeneration, Philosophical Theories, and Evidences of Regeneration* (1847), also in Fairchild's *Elements of Theology*, and his *Moral Science* (1892). No prominent difference now exists between the teaching at Oberlin and that of the so-called new-school Calvinism; for, as is noticeable now, even the distinctions of new school and old are lost sight of in discussions of much more important questions—so that a substantial orthodoxy waives its points of difference. In fact, Oberlin—long accused of dangerous radicalism—now occupies a position of general conservatism. The opinions of Pres. Finney have, therefore, chiefly a historical interest. His power as a great revivalist had been in his forcible presentation of human responsibility; and his doctrinal system not unnaturally centred in the human will. He aimed to show that personal sin and holiness are purely voluntary, neither transmitted nor transferred; that repentance is an immediate possibility and duty, and is the change required for acceptance with God. It followed, in his view, that the work of the Holy Spirit and of the atonement is a moral influence. His philosophy is not always clear—e.g., in regard to the self-determination of the will; and he uses terms such as will, volition, preference, etc., rather indiscriminately and without fundamental definition. He defines moral obligation figuratively, only, as a bond or ligament. He states its 'foundation' as 'the reason or consideration that imposes obligation on a moral agent to obey moral law,' and does not hesitate to say that 'moral obligation respects the ultimate intention only' —that 'moral character belongs to the intention only.' Further, moral obligation requires something in the end chosen which renders it deserving of choice for its own sake. This end is 'the highest well-being of God and of the universe of sentient existences.' And this, in its last analysis, resolves itself into 'the satisfaction of universal mind, that results from having every demand of the being fully met.' The intrinsic good of this is a saving clause in respect to utilitarianism; it is an Edwardsian benevolent regard to the blessedness of the universe as obligatory, in some way irrespective of tendency. This view plainly differs from the old orthodoxy. Dr. Duffield remarked (review of Finney, *Bib. Repos.*, 1848): 'What can we know of the satisfaction of God, and the best interests of the universe, in the complicated relations of universal mind? Nothing, but as God himself has made them known.' He is the lawgiver and the end. In further contrast is the ultimate nature of obligation, affirmed by Pres. Mark Hopkins. In regard to sanctification, the original teaching of Finney was that, while the will must be either in a benev-

olent state or not, yet a remnant of sin could remain in the regenerate, and a kind of second conversion must remove this. This was the theory of 'perfectionism,' or 'higher life,' that widely spread itself and tended to create an inner or esoteric circle of Christians, with catch-words and much self-consciousness, and a tendency to depreciate ordinary piety. But this view gave place at Oberlin to the generally received one of continuous sanctification, modified by the idea of the unity of moral action, which, however, does not exclude the sometimes marked passage from a genuine experience with a 'legal' coloring to one of fuller, freer faith (Rom. vii., viii.). See *Oberlin Evangelist* (1839–62); *Oberlin Quarterly Review* (1845–6). For other phases of early Oberlin teaching, see writings of Dr. Asa Mahan (pres. 1835–50): *Scripture Doctrine of Christian Perfection* (1839); *System of Intellectual Philosophy* (1845); *Doctrine of the Will* (1846); and, for later ethics, Pres. Fairchild's *Moral Philosophy* (1869); *Moral Science* (1892).

OBERON, n. *ō'bėr-ŏn* [derived by change of spelling from *Auberon*, more anc. *Alberon*—fr. Ger. *Alberich*, i.e., King of the Elves]: King of the Elves or Fairies, husband of Titania. O. is mentioned first as 'Roi du royaume de la féerie' in the old French poem *Huon de Bordeaux, pair de France*, which was afterward the basis of a popular prose romance. From the French, O. was borrowed by the English poets, Chaucer, Spenser, and others; but he is most familiarly known from his appearance in Shakespeare's *Midsummer Night's Dream*. From old French sources, also, Wieland derived part of the materials of his poem *Oberon*.

OBESE, a. *ō-bēs'* [F. *obèse*—from L. *obēsus*, fat, plump: It. *obeso*]: fat; fleshy. OBESE'NESS, n. *-nĕs*, or OBESITY, n. *ō-bĕs'ĭ-tĭ*, excessive fatness; unhealthy fatness.

OBESITY.

OBES'ITY, or COR'PULENCE: 'accumulation of fat under the integuments or in the abdomen, or in both situations, to such an amount as to embarrass the several voluntary functions.' Not only is a certain degree of fatness compatible with health, but (see FATS, ANIMAL) the fatty tissue is of considerable use in the animal body, partly for its physical, partly for its chemical properties; and only when the fatness begins to interfere with the discharge of any of the vital functions is it to be regarded as a morbid condition. Obesity may occur at any period of life, but is most frequent after the 40th year. After that time, often, in the case of men, much less muscular exercise is taken; while in women, the cessation of the function of child-bearing induces changes which tend remarkably to the deposition of fat. The extent to which fat may accumulate in the human body is enormous. Daniel Lambert, who died at the age of 40 years, weighed 739 lbs.; his exact height is not recorded, but the normal weight of a man 6 ft. high should not exceed 178 lbs. Elliotson has recorded the case of a female child, a year old, who weighed 60 lbs.

The predisposing causes of obesity are a peculiar habit of body, a defect of metabolism, often hereditarily transmitted, inactivity, sedentary occupations, etc.; while the more immediate or exciting causes are a rich diet, including fatty matters, and matters convertible in the body into fats, such as saccharine and starchy foods; and indulgence in such a diet to a greater extent than is requisite to balance the daily waste of the tissues. Fat meats, butter, nuts, and other oily vegetable substances, milk, saccharine, and farinaceous substances, are the most fattening articles of food: the use of alcoholic beverages, especially the malt liquors is conductive to obesity. In Africa and the East, where obesity is much admired in women, warm baths, indolence, and living upon saccharine and farinaceous articles, and upon various oily seeds, especially fenugreek, are the means usually employed to produce this effect.

The knowledge of the means of inducing obesity affords the best clew to the rational treatment of it. It is a popular belief that the administration of acids—e.g., vinegar, or one of the mineral acids—will check the deposition of fat; but if this effect is produced, it is only at the cost of serious injury to the digestive, and often to the urinary organs. Soap and alkalies, advocated a century ago, are possibly less objectionable than acids; but their prolonged use disturbs digestion; indeed it is chiefly by interfering with the digestion, and consequently the assimilation of food that these substances act as fat reducers.

The use of one of the common sea-weeds, sea-wrack (*Fucus vesiculosus*), has been advocated in the treatment of obesity; its value, if it possesses any, is dependent probably on the iodine it contains. It has been prescribed for this purpose in the form of a decoction (4 drachms to a pint of water) in doses of four table-

spoonfuls three times a day. The best known form of diet cure is that known as bantingism, after the name of a man who employed it successfully in his own case. Banting was 66 years of age, about 5 ft. 5 inches in stature and weighed 202 lbs. He states that he had led an active life, so that his corpulence was not through neglect of bodily exercise; nor was it from excessive eating, drinking, or self-indulgence of any kind, except that his diet of the simple aliments was more free than was requisite at his age.

By the advice of a medical friend, he adopted the following diet: For breakfast he took four or five ounces of beef, mutton, kidneys, broiled fish, or cold meat of any kind except pork; a large cup of tea (without milk or sugar), a little biscuit or one ounce of dry toast. For dinner, five or six ounces of any fish except salmon, any meat except pork, any vegetable except potato, one ounce of dry toast, fruit out of a pudding, any kind of poultry or game, and two or three glasses of good claret, sherry, or Madeira; champagne, port, and beer were forbidden. For tea, two or three ounces of fruit, a rusk or two, and a cup of tea without milk or sugar. For supper, three or four ounces of meat or fish, similar to dinner, with a glass or two of claret.

Under this very liberal diet, his weight in little more than a year decreased 46 lbs., while his girth round the waist reduced 12¼ inches. He died at the age of 82. The principle upon which this dietary was based (exclusion of fats, sugars, and starches) is the one followed, with some important modifications, in most of the systems recommended for the reduction of superfluous body fat. Combined with a restricted diet exercises of various sorts are usually prescribed. The treatment of obesity is, however, not so simple a matter as Banting's experience would appear to indicate, for the disease is allied to other faults in metabolism—diabetes, gout, etc., and an unwise restriction of diet may, while reducing the flesh, result in the establishment of some other more serious affection. Anything in the way of treatment, beyond a moderate restriction of the sugars, starches, and alcohol in the diet and gentle exercise, should be undertaken only under medical advice. The Ebstein treatment allows some fat, a moderate amount of meat, and almost entirely eliminates carbohydrates; while in the Oertel plan fats are not so freely given and more carbohydrates are allowed. Schweinger's system withholds fluids until two hours after the meal, whereas Germain See requires his patients to take much fluid.

OBEY, v. *ō-bā'* [F. *obéir*, to obey—from L. *obedīrĕ*, to obey—from L. *ob*, toward, and *audīrĕ*, to hear (see OBEDIENT)]: to comply with the commands, orders, or instructions of a superior, as a parent, a master, or a teacher; to yield submission to. OBEY'ING, imp. OBEYED, pp. *ō-bād.* OBEY'ER, n. *-ėr*, one who obeys.

OBFUSCATE, v. *ŏb-fŭs′kāt* [L. *obfuscātus*, obscured—from *ob*, intensive; *fuscātus*, made dark]: to darken; to obscure; to bewilder or confuse. OBFUS′CATING, imp. OBFUS′CATED, pp. OBFUSCATION, n. *ŏb′fŭs-kā′shŭn*, the act of darkening or confusing; the state of being darkened.

OBI, *ō′bĭ*, or OBEAH, or OBEA, *ŏ-bē′a*, or OBY, *ō′bĭ* [etymology unknown]: a kind of secret initiation into magical arts, and the craft practiced thereby, by a class of persons among the negroes of the W. Indies; derived originally from Africa. The practicer is called an *Obeah-man* or *Obeah-woman*. O. is essentially the same with the corresponding superstitions all the world over. See MAGIC: WITCHCRAFT.

OBI RIVER: see OB.

OBIMBRICATE, a. *ŏb-ĭm′brĭ-kāt* [L. *ob*, reversed, and Eng. *imbricate*]: in *bot.*, having the imbrication directed downward.

OBIT, n. *ō′bĭt* [F. *obit*, anniversary mass in honor of the dead: L. *obĭtus*, death—from *ob*, near; *ĭrĕ*, to go (usually, to go or come down): It. *obito*]: decease: obsequies; in the *Rom. Cath. Chh.*, anniversary service for the repose of a departed soul. As a certain ecclesiastical service was fixed to be celebrated on the day of death (*in die obitus*), the word, meaning originally decease, came to be applied to the service itself. Obit therefore signifies, in old church language, the service performed for the departed. It consisted, in the Roman Church, of those portions of the *Officium Defunctorum* which are called Matins and Lauds, followed by a Mass for the Dead, chanted, or occasionally read. Similar services are held on the day of the funeral and thereafter, but especially on the 3d and 7th days after death, and on the 30th day (the service thence called the *Month's Mind*); also on the anniversary: and though the name obit was primitively applied only to the first, it is now used of them all indiscriminately. OBITUAL, a. *ō-bĭt′ū-ăl*, pert. to the days when obsequies are to be celebrated. OBIT′UARY, a. *-ėr-ĭ*, relating to a death: N. a register of deaths; in the *Rom. Cath. Chh.*, a register of obitual days. POST OBIT [L. *post*, after]: after death; a deed to come into force after the death of the possessor of property on which money has been borrowed.

OBITER DICTUM, *ŏb′ĭ-tėr dĭk′tŭm* [L. *obiter*, incidentally; *dictum*, said]: phrase used in general for anything said by the way. In legal use, it refers to an opinion incidentally expressed by a judge, but no proper part of the decision in hand and not implying mature consideration. It is held to be objectionable so far as it anticipates any actual contest, and it cannot be quoted as authority in a case, like decisions in due course.

OBJECT, n. *ŏb′jĕkt* [L. *objectus*, cast or thrown in the way—from *ob*, in the way; *jactus*, thrown or cast: F. *objecter*, to oppose; *objet*, an object]: *literally*, a thing thrown before or presented, as to the mind or senses; anything set over against or before one; a thing seen; that with which the mind is occupied in the act of knowing; that on which the mind is fixed, as the end of an action or effort; anything presented to the mind; end; ultimate purpose: in *gram.*, the noun or pronoun which follows a transitive verb or a preposition: V. *ŏb-jĕkt′*, to oppose in words or arguments; to present or offer in opposition. OBJECT′ING, imp. OBJECT′ED, pp. OB′JECTLESS, a. *-lĕs*, without an aim or purpose. OBJECTOR, n. *ŏb-jĕkt′ẽr*, one who objects. OBJECTION, n. *ŏb-jĕk′shŭn* [F.—L.]: the act of presenting something in opposition; that which is presented in opposition; difficulty raised; fault found; doubt or scruple. OBJEC′TIONABLE, a. *-ă-bl*, liable or open to blame, or doubt, or suspicion. OBJEC′TIONABLY, ad. *-ă-blĭ*. OBJECTIVE, a. *ŏb-jĕk′tĭv*, relating to whatever is exterior to the mind; external; in *metaph.*, contrasted with and opposed to *subjective*—*subjective* denoting that which is to be referred to the thinker, and *objective* that which belongs to the thing thought of (see OBJECT, in Metaphysics): in *gram.*, the case which follows a transitive verb or a preposition; the accusative. OBJEC′TIVELY, ad. *-lĭ*. OBJEC′TIVENESS, n. *-nĕs*, the state of being an object. OBJECTIVITY, n. *ŏb′-jĕk-tĭv′ĭ-tĭ*, the state of being objective; objective character. OBJECT-GLASS, the glass placed at the end of a microscope or telescope, and toward the object, whose office is to form an image of the object (see below).—SYN. of 'object, n.': aim; motive; subject; purpose; cause; appearance;—of 'objection': exception; scruple; doubt; difficulty.

OB′JECT, in Metaphysics: that of which any thinking being or *Subject* can become cognizant. This subject itself, however, is capable of transmutation into an Object, for one may think about his thinking faculty. To constitute a metaphysical O., actual existence is not necessary; it is enough that it is conceived by the subject. Nevertheless, it is customary to employ the term objective as synonymous with real, so that a thing is said to be 'objectively' considered when regarded in itself, and according to its nature and properties; and to be 'subjectively' considered when it is presented in its relation to us, or as it shapes itself in our apprehension. Skepticism (philosophical) denies the possibility of objective knowledge—i.e., it denies that we can ever become certain that our cognition of an object corresponds with the actual nature of that object. See SKEPTICISM.—The verbal antithesis of objective and subjective representation is largely employed also in the fine arts; but even here, though the terms may be convenient, the difference expressed by them is one only of degree, not of kind. When a poem or a novel, for example, obtrudes the peculiar genius of the author, at the expense of a

clear and distinct representation of the incident and character which are appropriately involved, it is called a subjective work; when, on the contrary, the personality of the author retires into the background, or disappears altogether, the work is called objective. The poems of Shelley and Byron, the novels of Jean Paul Richter, Bulwer-Lytton, and Victor Hugo, and the paintings of the Pre-Raphaelites belong essentially to the subjective class; the dramas of Shakespeare, the novels of Scott, and the poems of Goethe, to the objective.

OBJECT-GLASS: see TELESCOPE: MICROSCOPE.

OBJURGATE, v. *ŏb-jėr′gāt* [L. *objurgatus*, chidden, rebuked—from *ob*, against; *jurgārĕ*, to sue, to quarrel]: to chide; to reprove. OBJUR′GATING, imp. OBJUR′GATED, pp. OB′JURGA′TION, n. *-gā′shŭn* [F.—L.]: reproof; reprehension. OBJURGATORY, a. *ŏb-jėr′gă-tėr-ĭ*, containing censure or reproof.

OBLATE, a. *ŏb-lāt′* [L. *oblātus*, borne against, brought forward—from *ob*, against; *latus*, borne or brought]: flattened or depressed at the poles, as a spheroid, shaped like an orange. OBLATE SPHEROID, a spheroid depressed or flattened at the poles.

OBLATE, a. *ŏb-lāt′* [L. *oblātus*, offered (see OBLATE 1)]: offered up; dedicated: in the *Rom. Cath. Chh.*, used of secular persons who, embracing a monastic life, have given all their goods to the monastery of which they have become members. *Oblates* designates a class of religious bodies which differ from the religious orders, strictly so called, in not being bound by the solemn vows of the religious profession. The institute of oblates was one of the many reforms introduced into the diocese of Milan by St. Charles Borromeo, toward the close of the 16th c. The members consisted of secular priests who lived in community and were bound merely by a promise to the bishop to devote themselves to any service which he should consider desirable for the interest of religion. St. Charles made use of their services chiefly in the wild and inaccessible Alpine districts of his diocese. This institute still exists, and has been recently introduced into England. Still more modern are the 'Oblates of the Blessed Virgin Mary,' a body of French origin which arose in the 19th c. and has been widely extended, and whose chief object is to assist the parochial clergy, by holding missions for the religious instruction of the people in any district to which they may be invited. This body also has been established in England and in Ireland. The constitution of all similar institutes is nearly the same. There is also a female institute of oblates, established in Rome, about 1440, by St. Francisca of Rome, and which consists of women associated for charitable and religious objects, and living in community, but bound only by promise, not by vow. OBLATION, n. *ŏb-lā′shŭn* [F.—L.]: anything presented in worship or religious service; an offering; a sacrifice.

OBLATION: see under OBLATE 2.

OBLIGE, v. *ō-blīj′* [F. *obliger*, to oblige—from L. *oblĭgārĕ*, to bind or fasten round, to oblige; *oblĭgātus*, bound round—from *ob*, to; *ligārĕ*, to bind: It. *obligare*]: to bind or constrain, as by a sense of propriety or duty, or by necessity, physical or legal; to lay under an obligation; to do a favor to; to please; to gratify. OBLI′GING, imp.: ADJ. having the disposition to oblige; conferring favors; civil; courteous; kind. OBLIGED, pp. *ō-blījd′*. OBLIG′ER, n. *-ėr*, one who obliges. OBLI′GINGLY, ad. *-lĭ*. OBLIGATION, n. *ŏb′lĭ-gā′shŭn* [F.—L.]: the binding power of a vow, promise, or oath; any act which binds one to do, or forbear to do, something to another, or for him; favor by which one is bound in gratitude; legal contract: in *Scotch law*, the binding effect of any legal contract: an obligation is said to be pure when it may be instantly demanded (called in other legal systems an absolute contract); an obligation is conditional when it depends for its legal effect on some event which may or may not happen. Obligations are divided also into verbal and written.—See OBLIGATION OF CONTRACTS. OBLIGATORY, a. *ŏb′lĭ-gā′-tėr-ĭ*, imposing duty; binding in law or conscience; coercive. OBLIGATO, a. *ŏb′lĭ-gâ′tō* [It. *obligato*, obliged]: in *music*, applied to a movement for some particular instrument restrained by certain rules; giving emphasis or expression to a passage. When a musical composition is constructed in more than one part, any part is said to be obligato which is employed not merely to strengthen the others, but is necessary to the melodic perfection of the whole. An accompaniment is said to be obligato which does not consist of mere chords, but has its own melody. OBLIGEMENT, n. *ō-blīj′mĕnt*, an act of kindness or courtesy; a benefit or favor conferred. OBLIGEE, n. *ŏb′lĭ-jē* [F. *obligé*, bound]: the person to whom another is bound. OBLIGOR, n. *ŏb′lĭ-gōr′*, the person who binds himself or gives his bond to another. —SYN. of 'obliging, a.': civil; polite; accommodating; courteous; complaisant; considerate; kind.

OBLIGATION OF CONTRACTS: binding force of the law which holds the parties to a contract to perform their agreement, and which gives a remedy to enforce its performance, or to make compensation for its non-performance; so that the contract is fulfilled by complying with whatever the existing law requires in relation to it. By the United States constitution, Art. I., sec. 10, states are prohibited from passing any laws impairing the obligation of contracts. Under this clause, the questions that have arisen for judicial decision have been: 1, What is a contract within the meaning of this section, and to what contracts does it apply? and 2, What laws interfere with this prohibition? It has been decided that this section embraces all contracts which affect property or some object of value and confer rights which might be asserted in a court of justice, whether the contracts be expressed or implied, executed or executory. Conveyances, statutory grants, and charters to private cor-

porations are included in the meaning of contract as used in that section. In the famous Dartmouth College case, the U. S. supreme court decided that this section referred to contracts of every description, and that the prohibition was applicable to contracts between the state and an individual, as well as to contracts between individuals. To avoid the effect of this decision, most of the state constitutions contain a clause that all charters of private corporations shall be subject to repeal or modification, and frequently a clause to that effect is inserted in the charter. This prohibition does not, however, apply to the charters and political powers given to municipal corporations, for the reason that such charters are not regarded as contracts, the very essence of a contract—viz., two parties with mutual obligations—being lacking: to such an instrument there is only one party, the public. This same case decides that the charters granted by the crown before the revolution come within this section: this case is now regarded as unquestioned authority. Whether a legislature can exempt property from taxation so as to bind all future legislation has not yet been judicially settled. The U. S. supreme court has intimated that, for a consideration sufficiently valuable, a state might partially release its taxing power; but several state courts have vehemently held that the taxing power is a sovereign right of the state, which a legislature has no right to surrender without express authority from the constitution of the state to do so. The effect of this clause on marriage contracts has not yet been ascertained by final adjudication. Though from the decisions it seems that a marriage is not a contract which comes within the scope of this clause, yet the authorities seem to agree that any law creating new grounds or new facilities for the divorce of parties married before the law was passed would impair the obligation of the marriage contract and would be unconstitutional; but this has not yet been positively decided. Alteration in the remedies for the violation of contract obligations, or changing the time and mode in which these remedies may be effected, or barring relief after a certain lapse of time, does not impair the obligation. Though congress has been given the power to pass bankrupt laws, it seems settled that this power is not exclusive, and the states may make insolvent laws without violating this clause of the constitution. The distinction has been made in the U. S. courts between laws impairing the remedy and laws impairing the obligation: the first—e.g., laws abolishing imprisonment for debt—being valid; while the others—e.g., stay laws, exemption laws, statutes of limitations—are invalid except when they affect subsequent contracts. The power of the state to enact police regulations for preservation of public health and morals is generally conceded; and it has been held that licenses to do certain acts, even when granted for a consideration—e.g., for the sale of lottery tickets—might be repealed without conflicting with this prohibition.

OBLIQUE, a. *ŏb-lēk'* [F. *oblique*—from L. *oblīquus*, sidewise, slanting: It. *obliquo*]: deviating from a right line; not parallel; aslant; not direct; by a side glance; an angle not of 90 degrees; sinister; applied to any case of a noun not the nominative; in *bot.*, unequal-sided. OBLIQUE'LY, ad. *-lĭ*. OBLIQUE'NESS, n. *-nĕs*, or OBLIQUITY, n. *ŏb-lĭk'wĭ-tĭ*, deviation from a right line; deviation from rectitude of conduct; irregularity. OBLIQUE ANGLE, any angle except a right angle or one of 90 degrees. OBLIQUE-ANGLED, having only oblique angles, or those not of 90 degrees. OBLIQUE ARCH, an arch whose direction is not at right angles to its axis. OBLIQUE CASE, in *gram.*, any case of a noun except the nominative. OBLIQUE FIRE, a fire the direction of which is not perpendicular to the line fired at. OBLIQUE LINE, a straight line which makes unequal angles with another. OBLIQUE MOTION, in *music*, one of the parts holding on a sound while another rises or falls. OBLIQUE SAILING, a ship not sailing in one direction to reach its destination, but first to the one point, then to the other—that is, upon some rhumb between the four cardinal points. OBLIQUE SPEECH, that speech or language which is quoted in a different person from that employed by the original speaker. OBLIQUE SPHERE, the sphere in that position in which the circles apparently described by the heavenly bodies in their diurnal rotation are oblique to the horizon. OBLIQUITY OF THE ECLIPTIC, the angle of the inclination of the equator and ecliptic.

OBLITERATE, v. *ŏb-lĭt'ĕr-āt* [L. *obliterātus*, blotted out or erased—from *ob*, against; *litus*, a smearing: It. *oblitĕrare:* F. *oblitérer*]: to efface, as anything written, printed, or engraved; to blot out; to erase; to destroy by time or other means, as from the memory. OBLIT'ERATING, imp. OBLIT'ERATED, pp.: ADJ. effaced; worn out. OBLITERATION, n. *ŏb-lĭt'ĕr-ā'shŭn*, the act of effacing; a blotting out or wearing out. *Note.*—L. *obliterātus* is said to be derived in the first instance from *ob*, and *litĕrā*, a letter, whose original sense is, 'a smear, a mark,' a connection being thus established with *litus*—see Skeat. —SYN. of 'obliterate': to efface; cancel; deface; destroy; expunge; blot out; wear out.

OBLIVION, n. *ŏb-lĭv'ĭ-ŏn* [F. *oblivion*—from L. *oblĭvĭōnem*, a forgetting or slipping out of the memory: It. *oblivione*]: state of being blotted out from the memory; cessation of remembrance; forgetfulness; remission of punishment. OBLIVIOUS, a. *ŏb-lĭv'ĭ-ŭs* [L. *obliv'ĭosus*, forgetful]: forgetful; causing forgetfulness. OBLIV'IOUSLY, ad. *-lĭ*. OBLIV'IOUSNESS, n. *-nĕs*, state of being oblivious or forgetful.

OBLONG, a. *ŏb'lŏng* [F. *oblong*—from L. *oblongus*, oblong —from *ob*, against; *longus*, long: It. *oblungo*]: longer than broad; drawn out in length: N. a figure longer than broad. OBLONG-OVATE, a. being between oblong and ovate.

OBLOQUY, n. *ŏb′lō-kwĭ* [L. *oblŏquī*, to speak against—from *ob*, against; *loquor*, I speak]: language which causes reproach and odium to rest on the character or actions of any one; slander.—SYN.: contumely; reproach; odium; censure; gainsaying; reviling; calumny; detraction; disgrace.

OBMUTESCENCE, n. *ŏb′mū-tĕs′ĕns* [L. *obmutescens*, becoming or growing dumb; *mutus*, dumb]: observation of silence; loss of speech.

OBNOXIOUS, a. *ŏb-nŏk′shŭs* [L. *obnoxĭus*, exposed or liable to hurt—from *ob*, against; *noxĭus*, hurtful: Sp. *obnoxio*, obnoxious]: offensive; hateful; odious; liable or exposed; censurable. OBNOX′IOUSLY, ad. *-lĭ*. OBNOX′IOUSNESS, n. *-nĕs*, state of being obnoxious; odiousness.

OBOE, n. *ō′boy* [It.]: a musical wind-instrument sounded through a reed; a stop in an organ—the same as HAUTBOY, which see.

OBOLUS, n. *ŏb′ŏ-lŭs* [L. *obŏlus;* Gr. *obŏlos*, an obolus or spit]: smallest of the four common Greek coins and weights: originally, as is generally supposed, a small piece of iron or copper, similar in form to the head of a spit, or spear-head, whence its name. In this form it was used as a coin, and a handful of 'oboli' was equivalent to a Drachma (see DRACHM). It was subsequently coined of silver, and in the ordinary round form, but still retained its original name; its value, both as a coin and a weight, was then fixed as the $\frac{1}{6}$ part of a drachma, so that in the Attic system it was equivalent to $1\frac{5}{8}d.$, or about $3\frac{1}{4}$ cents, and $15\frac{2}{5}$ troy grains, respectively; while the Æginetan obolus was worth $2\frac{3}{4}d.$, or a little more than $5\frac{1}{2}$ cents, as a coin, and $25\frac{2}{3}$ troy grains as a weight. Multiples and submultiples of this coin also were used; and pieces of the value of 5, 4, 3, 2, $1\frac{1}{2}$ oboli, and of $\frac{3}{4}$, $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ of an obolus, respectively, are found in collections of coins. OBOLUS, in *geol.*, a genus of bivalves characterized by their smooth, spherical shells, with their valves scarcely equal. OB′OLO, n. *-lō*, in the *Ionian Islands*, a copper coin in value about a half-penny. OBOLITE GRIT, *ŏb′ŏ-līt* [Gr. *lithos*, a stone]: in *geol.*, the Lower Silurian sandstones of Sweden and Russia—so called from the abundance of the shells of the obolus found in it: see OBELISK.

OBOOKI′AH, HENRY: Hawaiian Christian student: b. Hawaii, near 1795. Made prisoner in a native war, wherein his parents and brother were slain, he was rescued by his uncle, a high priest, and in 1805 took passage in a ship for New Haven, Conn., where he was attracted by the Yale College buildings; found weeping at the door of one of these, he was taken home and instructed by the Rev. E. W. Dwight. Samuel J. Mills learned of Obookiah's desire to be educated in the Christian religion, and to teach his countrymen; and he took him to the Mills home in Torrington, Conn., where he made good progress in study. Afterward he passed

two years at Andover Theological Seminary and some time in the Litchfield public school, and, under the care of the American Board, at a foreign-mission school in Cornwall, Conn. He died there 1818, Feb. 17; but his life led to the education of several Sandwich Islanders, and the founding of missions in the islands.

OBOVATE, a. *ŏb-ō'vāt* [L. *ob*, reversed; *ovātus*, egg-shaped]: in *bot.*, ovate, but having the narrow end downward.

O'BRIEN, *o-brī'ėn*, FITZ-JAMES: 1828–1862, Apr. 6; b. Limerick, Ireland. He studied at the University of Dublin, after which he spent two years in London, where he was connected with a journal and dissipated a fortune which he had inherited. He came to the United States about 1852, adopted the profession of journalism, and contributed sketches, poems, and stories to several leading literary publications in New York. In 1853 he became connected with *Harper's Magazine*, to which he furnished a large number of articles. He also wrote for *Putnam's Magazine* and the *Atlantic Monthly*, and furnished several plays, one of which, *A Gentleman from Ireland*, had an enduring popularity. He was a member of the 7th regt., N. Y. vols., 1861, and became a staff-officer under Gen. Lander. In a skirmish 1862, Feb. 16, he received a wound which necessitated a surgical operation and was succeeded by lockjaw, from which he died. *The Poems and Stories of Fitz-James O'Brien*, with personal recollections by some of his associates, were collected by William Winter 1881. Among his most popular stories are *The Diamond Lens* and *The Golden Ingot.* He died in Virginia.

O'BRI'EN, JEREMIAH: 1740–1818, Oct. 5; b. Scarborough, Me.: commander of the American force in the first sea-battle of the revolution. He had removed to Machias and engaged in the lumber business. The *Margaretta*, an armed British schooner, entered the harbor 1775, May, and the officers threatened to destroy the town if a liberty pole which the inhabitants had recently erected was not removed. The people resolved to seize the officers; but they sailed down the river, followed by a sloop manned by 60 volunteers, of whom O'B. was chosen captain. The patriots had but little ammunition, and some were armed only with pitchforks; but, after a sharp conflict, the *Margaretta* was taken. The provincial govt. soon commissioned O'B. captain. He captured several prizes, was taken prisoner and sent to England, escaped, and returned to Maine. After living several years at Brunswick, he was made collector of the port at Machias, which office he held till his death.

O'BRI'EN, LUCIUS RICHARD: Canadian artist: b. 1832, Aug. 15, at Shanty Bay, Lake Simcoe. He studied architecture, practiced as civil engineer, and was the first pres. of the Royal Canadian Acad. of Arts. His pictures, landscape and marine, are recently in water-color only: among the principal are two pictures of Quebec (1881), painted for the queen; *Cape Diamond*, for the Marquis of Lorne, wedding-present for Prince Leopold, 1882; *September on the Saguenay*, owned by the Marquis of Lansdowne; *Footprints of an Avalanche*, at the Royal Acad., London, 1887, May.

O'BRI'EN, WILLIAM SMITH: 1803, Oct. 17—1864, June 18; second son of Sir Edward O'Brien, Bart. of Dromoland, County Clare, Ireland. He was educated at Harrow School, whence he passed to Trinity College, Cambridge. He entered parliament for the borough of Ennis 1826, and was a warm supporter of Rom. Cath. emancipation. In 1835 he was returned on advanced liberal principles for the county of Limerick; and for several years strongly advocated the claims of Ireland to a strictly equal share with England in legislative as well as executive measures. Professing his inability to effect this in the united legislature, and having embroiled himself with the speaker by refusing to serve on committees (for which refusal he was committed to prison in the house by the speaker's order), he withdrew from attendance in parliament 1841, and joined actively with Daniel O'Connell (q.v.) in agitation for a repeal of the legislative union between England and Ireland. In the progress of that agitation, a division having arisen on the question of *moral* as against *physical force* between O'Connell and the party known as 'Young Ireland,' O'B. sided with the latter and became recognized as its head; and when the political crisis of 1848 eventuated in a recourse to arms, he took part in an attempt at rebellion in s. Ireland, which in a few days came to an almost ludicrous conclusion. He was in consequence arrested, and, having been convicted, was sentenced to death. The sentence, however, was commuted to transportation for life; and after the restoration of tranquillity in the public mind in Ireland, he, with the other political exiles, was permitted to return to his native country. From that date (1856), he spent much of his time in foreign travel; and though he wrote more than once in strong disapproval of the existing state of things, he abstained from all active share in the political proceedings of any party.

OBRY'ZUM, n. [LL. in full, *Obryzum aurum*, pure gold]: fine, pure, or tested gold.

OBSCENE, a. *ŏb-sēn'* [F. *obscène*—from L. *obscœnus*, detestable, unnatural]: impure in language or action; indecent; filthy; in *OE.*, inauspicious. OBSCENE'LY, ad. *-lĭ*. OBSCENE'NESS, n. *-nĕs*, or OBSCENITY, n. *ŏb-sĕn'ĭ-tĭ*, impurity in language or action; lewdness.—SYN. of 'obscene': immodest; impure; unchaste; lewd; foul; offensive; disgusting.

OBSCENE PRINTS.

OBSCENE PRINTS or BOOKS or PICTURES: objects of prohibitive legislation as to their sale or exhibition. In Britain, the legal provisions are severe in relation to them.—By the U. S. revised statutes, all persons are prohibited from importing into the United States, from any foreign country, any obscene book, pamphlet, paper, writing, advertisement, circular, print, picture, drawing, or other representation, figure, or image, on or of paper or other material. No invoice or package whatever, or any part of one, in which any such articles are contained, may be admitted to entry; and all invoices and packages whereof any such articles shall compose a part are liable to be proceeded against, seized, and forfeited by due course of law. All such prohibited articles in the course of importation must be detained by the officer of customs; and any judge of any district or circuit court of the United States, within the proper district—before whom complaint in writing of any such violation is made, to the satisfaction of such judge, and founded on knowledge or belief, and, if upon belief, setting forth the grounds of such belief, and supported by oath or affirmation of the complainant—may issue, conformably to the constitution, a warrant directed to the marshal, or any deputy-marshal, in the proper district, directing him to search for, seize, and take possession of any such article or thing, and to make due and immediate return thereof, to the end that the same may be condemned and destroyed by proceedings, which shall be conducted in the same manner as other proceedings in case of municipal seizure, and with the same right of appeal or writ of error; and any officer, agent, or employé of the govt. of the United States who shall knowingly aid or abet any person engaged in any violation of any of the provisions of law prohibiting the importing, advertising, dealing in, exhibiting, or sending or receiving by mail, obscene or indecent publications or representations, is guilty of a misdemeanor, and for every offense is punishable by a fine of not less than $100 and not more than $5,000, or by imprisonment at hard labor for not less than one year nor more than ten, or both. No obscene, lewd, or lascivious book, pamphlet, picture, paper, print, or other publication of an indecent character, nor any letter upon the envelope of which, or postal card upon which, indecent or scurrilous epithets may be written or printed, may be carried in the mail; and any person who shall knowingly deposit, or cause to be deposited, for mailing or delivery, any such articles or things, is guilty of a misdemeanor, and shall for every offense be fined not less than $100 nor more than $5,000, or imprisoned at hard labor not less than one year nor more than ten years, or both. Every person who, within the District of Columbia or any of the Territories of the United States, or other place within exclusive U. S. jurisdiction, sells, or lends, or gives away, or in any manner exhibits, or offers to sell, or to lend, or to give away, or in any manner to exhibit, or otherwise

publishes or offers to publish in any manner, or has in his possession, for any such purpose, any obscene book, pamphlet, print, or picture, shall be imprisoned at hard labor in the penitentiary not less than six months nor more than five years for each offense, or fined not less than $100 nor more than $2,000, with costs of court.—See VICE, THE NEW YORK SOCIETY FOR THE SUPPRESSION OF.

OBSCURANT, n. *ŏb-skū′răn̆t* [L. *obscūran′tem*, rendering dark or obscure—from *obscūrus*, dark]: one who, in writing or in teaching, opposes the progress, or at least the general diffusion, of knowledge among the great mass of the people. OB′SCURANT′ISM, n. *-ĭzm*, the principles of an obscurant. OBSCURANT′IST n. *-ĭst*, one who sets himself to oppose the progress of modern science; an obscurant. Those who avow such a doctrine, and have written to explain and defend it, profess earnestly to desire the progress of all true knowledge, as a thing good in itself; but they look with apprehension on its indiscriminate diffusion among men, as tending to only half-knowledge, to presumption, to fanaticism, to discontent, and as prejudicial to the religious welfare of men in general, and as possibly injurious to their material interests. They profess only to reduce to practice the motto, 'A little learning is a dangerous thing.' It cannot be doubted, however, that there are fanatics of ignorance as well as fanatics of science; and that the only ultimate remedy for the ills that pertain to darkness must be not darkness deeper or prolonged, but light. Still the obscurantists may do an incidental service by pointing out the perils of a merely intellectual advancement, with no corresponding moral development. The trust in a merely mental training and equipment is fallacious, as regards any genuine enlightenment or progress; and he is the worst of all obscurantists who is indifferent to a darkness which obscures man's moral discernments.

OBSCURE, a. *ŏb-skūr′* [F. *obscur*—from L. *obscūrŭs*, dark, with little light]: dark; with little light; not much known; lying remote from observation; of humble condition; not easily read or understood; not clear: V. to darken; to hide from view; to make less visible or intelligible; to conceal or disguise; to tarnish; to eclipse. OBSCUR′ING, imp. OBSCURED′, pp. *-skūrd′*: ADJ. made dark; hidden. OBSCURE′LY, ad. *-lĭ*, in an obscure manner; darkly; not clearly. OBSCURATION, n. *ŏb′skū-rā′shŭn*, the act of obscuring or darkening; the state of being obscured. OBSCURITY, n. *ŏb-skū′rĭ-tĭ* [F. *obscurité*—from L. *obscurĭtātem*, darkness]: darkness; state of being unknown to fame or unnoticed; darkness of meaning.—SYN. of 'obscure, a.': indistinct; dim; darksome; intricate; abstruse; mysterious; difficult; unknown; unnoticed; retired; mean; humble; imperfect; defective; shaded; darkened; hidden; not clear; not legible; blind; gloomy.

OBSECRATION, n. *ŏb'sĕ-krā'shŭn* [F. *obsécration*—from L. *obsecrātĭōnem*, a beseeching, imploring—from *ob*, *sacer* or *sacra*, sacred]: supplication; entreaty; that part of a speech in which the assistance of God or man is implored.

OBSEQUIES, n. plu. *ŏb'sĕ-kwĭz* [F. *obsèques*, obsequies—from mid. L. *obsequiæ*, funeral rites—from L. *obsĕquĭŭm*, a following or attendance on some great person—from *ob*, near; *sequi*, to follow]: funeral rites and solemnities: see FUNERAL RITES: ETC.

OBSEQUIOUS, a. *ŏb-sē'kwĭ-ŭs* [F. *obséquieux*—from L. *obsĕquĭŭm*, the following some great person, complaisance; *obsĕquĭōsus*, very complying, obsequious—from *ob*, in the way; *sequor*, I follow]: promptly obedient or compliant to the will of another; compliant to excess; meanly or servilely condescending; in *OE.*, belonging to obsequies; funereal; mourning. OBSE'QUIOUSLY, ad. *-lĭ*, in an obsequious manner; obediently; in *OE.*, with reverence for the dead. OBSE'QUIOUSNESS, n. *-nĕs*, prompt obedience; servile submission.—SYN. of 'obsequious': servile; compliant; obedient; yielding; attentive.

OBSEQUY, n. *ŏb'sĕ-kwĭ:* singular of OBSEQUIES, which see; in *OE.*, funereal ceremony; obsequiousness.

OBSERV'ANTISTS, or OBSERV'ANT FRANCIS'CANS: the more rigorous of the classes into which the order of Franciscans became separated in the 15th c. For the earlier history of the controversies in that order, on the interpretation of the original rule and practice established by St. Francis for the brethren, and of the separate organization of the two parties at the time of Leo X., see FRANCISCANS. The advocates of the primitive rigor were called *Observantes*, or *Observantines*, or *Strictioris Observantiæ;* but both bodies were still reputed subject (though each free to practice its own rule in its own separate houses) to the general administrator of the order, who, as the rigorists were by far the more numerous, was a member of that school. By degrees, a second reform arose among a party in the order, whose zeal the rigor of the O. was insufficient to satisfy; and Clement VII. permitted two Spanish friars, Stephen Molena and Martin Guzman, to carry out in Spain these views in a distinct branch of the order, who take the name of *Reformati*, or Reformed. This body was in later times incorporated with the O. under one head. Before the French Revolution, they are said to have numbered above 70,000, distributed over more than 3,000 convents. Since that time, their number has been much diminished; but they still are very numerous and widespread in Europe, the new world, and the missionary districts of the East. In Ireland and England, and for a considerable time in Scotland, they maintained themselves throughout the times of rigor, and several communities remain in England and Ireland.

OBSERVA'TION-CAR: railway-car, with sides open or fitted with glass, to allow of observation of scenery, or inspection of the road.

OBSERVA'TION AND EXPER'IMENT: the leading features of modern science, as contrasted with the philosophy of the ancients. They are indispensable as the bases of all human knowledge; and no true philosophy has ever made progress without them, either consciously or unconsciously exercised. Thus, by Socrates, Plato, and Aristotle, no less than by Archimedes and the ancient astronomers, observation and experiment are extensively, though not prominently or always obviously, employed; and it was by losing this clue to the spirit of their masters' teaching that the later disciples in these schools of philosophy missed the path of real progress in the advancement of knowledge. It was in the latter half of the 16th c. that the minds of philosophers were first *consciously* awakened to the importance of observation and experiment, as opposed to dogmatic authority and abstract reasoning. This result was occasioned first by the discoveries and controversies of Galileo in Florence; and to the same end were contributed the simultaneous efforts of a number of philosophers—Tycho Brahé in Holland, Kepler in Germany, William Gilbert in England—who were soon followed by a crowd of kindred spirits. The powerful mind of Francis Bacon (q.v.) lent itself to describe the newly awakened spirit of scientific investigation; and though he ignored or affected to despise the results achieved by the great philosophers just mentioned, he learned from them enough to lay the foundation of a philosophy of inductive science, which, if we look at the course of scientific progress since his day, seems to have been almost prophetic: see NOVUM ORGANON. The difference between observation and experiment may be said to consist in this, that by observation we note and record the phenomena of nature as they are presented to us in her ordinary course; whereas by experiment we note phenomena presented under circumstances artificially arranged for the purpose. Experiment is thus the more powerful engine for discovery, since one judiciously conducted experiment may provide the data which could result from only a long series of observations.

OBSERVATION, ERRORS OF: errors which necessarily occur in the measurement of any magnitude. If the same physical magnitude is repeatedly measured, the single measure always vary among themselves, provided only the measuring instrument reads finely enough. The variations are due in part to physical causes, such as changes of temperature affecting the instrument, and partly to psychological causes which make the handling and reading of the instrument irregular. The theory of probability (q.v., and also see LEAST SQUARES, METHOD OF) shows that the average of a series of measurements is a best value to use; i.e., that it is subject to less error

in the long run than any of the single measurements or than any other value which might be computed from them.

The difference between any single measurement and the average is called the *deviation* of that measurement, and the average of the single measurements, or *average deviation* (also called the 'mean variation' and the 'variable error') gives a useful measure of the variability of the series; the smaller the average deviation, the greater the precision of the process of measurement. Another measure of the variability is the 'mean square deviation,' equal to the square root of the sum of the squares of the single deviations. Another similar measure, frequently used, is the 'probable error,' defined as a quantity such that half of the deviations are larger than it and half smaller. These three measures have fixed theoretical relations to each other, such that given any one, the other two may be computed by multiplying by a constant factor. If the average deviation is taken as 1.00, the mean square deviation is approximately 1.25 and the probable error 0.84.

The reliability of an average, i.e., the assurance with which it can be taken as representing the true average obtained from an indefinitely large number of observations—is greater the larger the number of observations, and the less their variability. The 'probable error of the average' is computed by dividing the probable error of the single measurement, as above defined, by the square root of the number of cases. The meaning is that, of empirically determined averages, about half will deviate from the true average by more than the probable error of the average, and about half by less.

Besides these errors which are due to the variability of the process of measurement, any given method of measurement is usually exposed to 'constant errors' which cause all of the measurements to differ from the real magnitude in one direction and by a fixed amount. Such errors may inhere in the instrument, in the individual observer (constituting his 'personal equation'), or in all observers alike. Many such errors can be detected by checking one method of measurement against another, but as no method is probably quite free from constant errors, there will always be a residual error, which may, however, be known not to exceed a certain amount.

In psychology, the constant and variable errors of manipulation, and especially of sense observation, have been much studied for their own sake. The cases chosen for study are those in which the true value can be determined with an accuracy far exceeding that of the method of sense observation studied. Thus a line, the length of which has been measured by an instrument, is estimated by the unaided eye, and thus the constant and variable errors of eye-measurement are determined. The difference between the true value and the single estimation is called the 'gross error,' and the average of the gross errors is called the 'average error.'

OBSERVATORY.

OBSER'VATORY: institution supplied with instruments for the regular observation of natural phenomena—astronomical, meteorological, or magnetical. In some observatories, all three classes of observation are carried on; but in most observatories special attention is given to astronomy alone, and only such meteorological observations are taken as are required for calculation of the effect of atmospheric refraction on the position of a heavenly body; there are, however, a few observatories engaged solely in meteorological or magnetical observations: the astronomical observatories are the theme of this article. They are conveniently divided into two classes—public and private observatories—the former concerned with those observations which, from their nature, require to be continued on the same system for long periods of time; while the latter are founded usually for some special object, which may be attained with comparatively small expenditure of time and labor.

The most important work in public observatories is the determination of the movements of the sun, moon, and planets among the stars; and, as a corollary to this, the relative positions of the stars to which the other heavenly bodies are referred. In early times, the Greek astronomers fixed these positions by means of armillary spheres and astrolabes, having concentric graduated circles, on which the latitudes and longitudes could be read, when a pair of sights was pointed to the heavenly body. Ptolemy made use of a quadrant, with which he measured zenith distances on the meridian; and, many centuries later, Tycho Brahé converted this form of instrument into an altazimuth, by mounting it on a vertical axis in connection with a horizontal or azimuth circle. With this instrument, Tycho Brahé, at the observatory which the king of Denmark erected for him, made a long series of observations of the altitudes and azimuths of the heavenly bodies, measuring with great assiduity their angular distances from each other, by means of a sextant—a method of observation which Flamsteed afterward employed with a much-improved form of the instrument, and which is now extensively used with the reflecting sextant, for finding longitude at sea. It was not till the middle of the 18th c. that the improvement of the clock by Graham enabled astronomers to rely on it for determination of right ascensions by the times of passage across the meridian, instead of by measuring them with a graduated circle. The quadrant was then fixed in the meridian, and, being attached to a massive wall, its dimensions were increased, and greater accuracy thereby secured in determination of meridian zenith distances. Two such instruments, pointing respectively n. and s., were erected at the Royal Observatory, Greenwich, England, and used by Bradley and his successors from 1750 till they were displaced by the mural circle (see CIRCLE, MURAL)—an instrument vastly superior in principle, since the troublesome errors of centring of the quadrant were eliminated by combining the readings of

opposite parts of a graduated circle; while the effect of division errors was much reduced by taking the mean of the readings at six or eight equidistant points of the circle. At the same time, the accuracy of the readings was greatly increased by the invention of the micrometer-microscope, which made it possible to measure spaces to $\frac{1}{100000}$ of an inch. Neither the quadrant nor the mural circle, however, could be relied on for accurate motion in the plane of the meridian; but Römer remedied this defect by inventing a separate instrument, the Transit (q.v.), which enabled astronomers to observe the times of meridian passage or transit with great accuracy, and thus to determine the differences of right ascension of the heavenly bodies by means of the apparent diurnal movement. With the transit and quadrant, Bradley commenced that series of observations of the positions of the sun, moon, and planets, and of stars, for reference, which has been continued ever since at Greenwich, and on which, in combination with less extensive series at Paris and Königsberg, all our tables of the motions of the heavenly bodies are founded. In modern observatories, the transit and mural circle are combined into one instrument, the transit-circle—a change which has been rendered possible chiefly by the improvement in graduated circles since the invention of Troughton's dividing-engine—the unwieldy size of the old quadrants and mural circles necessitating an attachment to a massive wall. Although Reichenbach made transit-circles at the beginning of the 19th c. for several foreign observatories, including that of Dorpat, the lightness of their structure and their lack of stability prevented their general introduction, and the mural circle held its place in the principal observatories till Sir George Airy designed the Greenwich transit-circle 1851—an instrument of most massive construction, which has served as model for nearly all in recent years. The main features of the modern transit-circle are: (1) that it is not reversible, its collimation error being determined by means of two collimators or reversed telescopes, pointing at each other and at the transit-telescope, n. and s. respectively; (2) that a spirit-level is not used, the level error being found by means of the reflection of the wires from the horizontal surface of mercury. These two negative characteristics, while admitting great massiveness in construction (the Greenwich instrument weighs more than a ton), have removed three troublesome sources of error—inequality in the pivots, lateral flexure of the telescope in the process of reversion, and the effect of currents of heated air on a spirit-level. An important auxiliary to the transit-circle is the chronograph, an American invention, which in various forms is now found in all well-equipped observatories, the principle in all cases being the same—viz., the registration, on a revolving cylinder of paper, of the times of transit across the system or spider-lines of the transit-circle, as well as of the seconds of the sidereal clock, by

means of electric currents, which pass through electro-magnets, when the circuit is closed either by the observer or by the clock, thus causing an instantaneous attraction of a piece of soft iron, and producing a corresponding mark on the paper with either a pen or a steel point. This system, while improving somewhat the accuracy of the individual observations, admits of a large series of observations at intervals of two or three seconds, and leaves the observer free to make several observations of zenith distance during the passage of a star across the field of view. In the construction of the sidereal clock, important in modern astronomy, considerable improvements have been made since Graham's time, the original gridiron pendulum having been replaced successively by the mercurial and the zinc and steel, and the dead-beat escapement by Dennison's gravity and Airy's detached escapement. Recently an apparatus depending on the attraction of a movable magnet connected with a float in a siphon barometer has been applied by Sir George Airy to the sidereal clock at Greenwich, to correct for the effect of variations in the atmospheric pressure on the motion of the pendulum. This clock is placed in a basement kept at nearly uniform temperature—an important condition, which has contributed to make its performance very far superior to that of any other clock, and equal to all requirements of the methods of observation now in use. With instruments such as those above noted, regular observations of the sun, moon, and planets, and of fundamental stars, are made at Greenwich, Paris, Washington, and Oxford, supplemented at Greenwich Observatory by extra-meridian observations of the moon with a massive altazimuth, which can be employed when the moon is too nearly new moon to be seen on the meridian in full daylight, and which is in fact used to secure an observation on every night when the moon is visible. The observations of stars at these four observatories are directed to the most accurate determination of the places of a limited number, and the deduction of their proper motions by comparison with the results obtained by Bradley, by Piazzi (with an altazimuth by Ramsden at Palermo), and by Groombridge; but at other observatories differential or zone observations of large numbers of stars have been made, with the object of making a complete and fairly accurate survey of the heavens, the rhomb or ring micrometer being used for this purpose. Among those who have applied themselves to this work are Lacaille at the Cape of Good Hope, Lalande at Paris, Bessel at Königsberg, Argelander at Bonn. These zone observations are now being repeated with the transit-circle at a number of observatories, associated together for the purpose of getting far more accurate places than was possible with the equatorial. A large number of observatories, chiefly in Germany and the United States, are engaged in a very different class of observations viz., differential observations, with the

Equatorial (q.v.), of comets and small planets as referred to comparison-stars, and the search for such objects; while at other observatories, notably that of Pulkowa, the measurement of double stars with the micrometer is the chief object. Of late years, two new subjects have been introduced into the routine of observatory work—photography and spectroscopy. The former was carried on for many years at Kew Observatory, under De La Rue's auspices, and at his private observatory at Cranford; and the work is now continued at Greenwich: the latter has been taken up at a number of Italian observatories, particularly at Rome by P. Secchi; and it now forms part of the regular system at Greenwich: while the observatories at Paris, Berlin, and Vienna are equipped for these physical observations, and in the United States and Australia they are vigorously carried on at several observatories—Melbourne, Australia, in particular, being provided with a four-ft. equatorial reflector for this purpose, as well as for examination of nebulæ. The most important work of an observatory, however, consists, not in making observations which are easily multiplied, but in reducing and publishing them—a task of far greater labor, and requiring far higher qualifications. However various may be the observations, the method of eliminating their errors is the same in all cases, and similar mathematical considerations apply to their reduction, whether they be meridian observations, micrometer measures, measures of photographs, or spectroscopic observations; and when such treatment is required, in any inquiry, it should be undertaken at a public observatory, where this rigorous method will be applied.

The work of private observatories hardly admits of being specified, though its general character has above been indicated; it suffices to mention the observations of double stars and nebulæ by the two Herschels, Groombridge's catalogue of circumpolar stars, Smyth's double-star measures, Carrington's Redhill catalogue and solar observations, the nebular observations of Lord Rosse and Lassell, De La Rue's long series of photographs, and the spectroscopic observations of Huggins and Lockyer.

In addition to regular astronomical observations of all kinds, national observatories are charged usually with distribution of time signals, and rating of chronometers for the navy—matters of great practical importance, especially in countries where time is communicated directly by telegraph to hundreds of towns.

In the United States, the first observatory was that of the Univ. of N. Car., 1831, burned 1838; the next, at Williams Coll., built 1837; then, 1838, at Western Reserve Coll., Ohio, under Prof. Loomis, and the high-school O. at Philadelphia; in 1844, the Cincinnati O., under the brilliant and energetic Prof. O. M. Mitchel (q.v.); following which, the West Point O., under Prof. Bartlett; the Naval O. at Washington, under Capt.

Gilliss, with a 26-in. equatorial; the Harvard Univ. and Georgetown Coll. (D. C.) observatories, and others. The Dudley O., Albany, N. Y., 13-in. equatorial, was dedicated 1856. A telescope is but one item of equipment, and the work done with very large telescopes is not in proportion to their size; yet the size indicates a scale of expense—hence presumably of facilities for work. In 1872 an object-glass of 26 in. was made for the Washington O. In 1880 H. H. Warner built an O. for Prof. Swift at Rochester, N. Y., with object-glass 16 in., focal length 22 ft., and many improvements of dome, etc., by Prof. Swift. In 1887 notices are found of the Morrison O., Glasgow, Mo., 12½-in. equatorial; the McCormick 26-in. refractor; the Washburn 15½-in. equatorial; Bucknell Univ., Lewisburg, Penn., 10-in. equatorial; and the large Paine bequest to Harvard O. of $164,000, and the Boyden fund of $230,000. In 1888, June 1, the Lick O., on Mount Hamilton, Cal., 50 m. s. of San Francisco, was formally transferred, on completion, to the Univ. of Cal. Of the Lick bequest of $750,000, all but $90,000 had been expended. The object-glass of the telescope (largest in the world) is 38-in. diameter, giving a field of 36 in. and a focal length of 56 ft. 2 in.; the tube of sheet-steel 42-in. diam.; the dome 75-ft. diam., revolving with 225 lbs. horizontal pressure. The night-fogs of the coast, reaching up half the height of the mountain, have been found useful in shutting off the heat-radiation from the earth, that disturbs telescopic vision (see LICK OBSERVATORY). In the same year, 1888, the Dearborn O., with 18½-in. equatorial, was removed from Chicago to Evanston, Ill. In 1889 a 40-in. refractor was ordered for the Univ. of Southern Cal., $200,000 being available; a new O. was established in Georgetown, D. C., for a 26-in. refractor; and Harvard Univ. received $50,000 from Miss C. W. Bruce of New York, for a photographing telescope with 24-in. objective, focal length 11 ft., which Prof. Pickering proposes to place on some mountain. Yale, Amherst, etc., are active centres of astronomical work; also Hamilton Coll., N. Y., and Carleton Coll., Minn. Of private observatories, Prof. Rutherford's, New York city, was famous for its photographic results; and gentlemen of wealth, e.g., the late Samuel Wilde, Montclair, N. J., and the Hon. S. V. White, Brooklyn, N. Y., have mounted excellent instruments. The purely scientific results of work in this country must be sought in astronomical journals; among those of popular as well as scientific interest are the very numerous asteroids discovered by the late Prof. Peters of Hamilton Coll., the two satellites of Mars by Prof. Hall of Washington, and the many comets announced by Prof. Swift and others.

OBSERVE, v. *ŏb-zėrv'* [OF. *observer*—from L. *ob-servārĕ*, to mark, to note—from *ob*, intensive; *servo*, I watch or wait for]: to take notice of; to note; to mark; to see or behold with some attention; to utter or express, as a remark or opinion; to keep religiously; to celebrate; to comply with; to practice; to make a remark. OBSERV'ING, imp.: ADJ. giving particular attention; habitually taking notice; remarking. OBSERVED', pp. *-zėrvd'*. OBSER'VER, n. *-zėr'vėr*, one who pays careful attention to things; one who keeps laws or customs; a spectator. OBSER'VINGLY, ad. *-lĭ*. OBSER'VABLE, a. *-vă-bl*, worthy of observation; remarkable. OBSER'VABLY, ad. *-blĭ*. OBSER'VABLENESS, n. *-bl-nĕs*, the state or quality of being observable or remarkable. OBSERVANCE, n. *ŏb-zėr'vănsˢ* [F.—L.]: performance; rule of practice; ceremonial reverence in practice; performance of religious rites and ceremonies. OBSERVANDA, n. plu. *ŏb'zėr-văn'dă* [L.]: things to be observed. OBSERVANT, a. *ŏb-zėr'vănt*, attentive in viewing or noticing; watchful; mindful: N. a diligent observer. OBSER'VANTLY, ad. *-lĭ*. OB'SERVANTS, n. plu., in OE., slavish attendants. OBSERVATION, *n. ŏb'zėr-vā'-shŭn* [F.—L.]: the act of noticing or remarking; the expression in words of what is observed or thought; comment or remark; in *Scrip.*, outward show, as, 'the kingdom of God cometh not with observation:' exhibition; in *astron.* and *nav.*, the angular measurement of any space in the heavens; in *science*, the act of ascertaining temperature, or of noting or scrutinizing some fact or occurrence in nature. OB'SERVA'TIONAL, a. *-ăl*, containing remarks. OBSERVATOR, n. *ŏb'zėr-vā'tėr* [L.]: one who observes. OBSERVATORY, n. *ŏb'zėr'vă-tėr-ĭ*, building fitted up and set apart for astronomical and physical observations (see above).—SYN. of 'observant, a.': regardful; obedient; submissive; —of 'observation': notice; attention; comment; note; remark.

OBSESSION, n. *ŏb-sĕsh'ŏn* [L. *obsessio*, n., a besieging, *obsidere*, to besiege, *ob*, before; *sedeo*, sit]: the mental state in which a patient is supposedly tormented by an evil spirit outside trying to get possession of him. In 'possession,' the demon is within. Obsession is also used for a morbidly imperative idea.

OBSIDIAN, n. *ŏb-sĭd'ĭ-ăn* [Gr. *opsĭănos*, a kind of pumice-stone of a glassy appearance—less probably from *Obsĭdĭŭs*, a Roman who first brought it from Ethiopia]: glassy lava, almost indistinguishable from artificial glass slag; a true native glass, found near many volcanoes. This mineral was accurately described by Pliny under the name which it still bears. It is composed of silica (70 to 80 per cent.), alumina, lime, soda, potash, and oxide of iron. It is hard and brittle, with remarkably vitreous lustre and perfectly conchoidal fracture, the edges of the fractures very sharp, and cutting like glass. It varies from semitransparency to translucency only on the edges. It is often black, or very dark gray;

sometimes green, red, brown, striped, or spotted; sometimes *Chatoyant* (q.v.) or *avanturine*. It occurs in volcanic situations, and often in close connection with pumice, in roundish compact pieces, in grains, and in fibres. It is capable of being polished, but is apt to break in the process. It is made into boxes, buttons, eardrops, and other ornamental articles; and anciently, before the uses of the metals were well known, it was employed for making arrow and spear heads, knives, etc. It is found in Iceland, the Lipari Isles, Vesuvius, Sardinia, Hungary, Spain, Teneriffe, Mexico, S. America, Madagascar, Siberia, etc. Black obsidian was used by the ancients for making mirrors, and was brought to Rome from Ethiopia. It was used similarly in Peru and Mexico.

OBSIDIONAL, a. *ŏb-sĭd'yŭn-ăl* [F. *obsidional*—from L. *obsĭdiōnālis*—from L. *obsĭdiōnem*, a siege or blockade]: pert. to a siege. OBSIDIONAL CROWN, among the *Romans*, a mark of honor in the form of a crown, constructed of grass and twigs interwoven, and bestowed on him who held out in a siege, or caused one to be raised.

OBSOLESCENT, a. *ŏb'sō-lĕs'sĕnt* [L. *obsoles'cens* or *obsolescen'tem*, growing out of use]: going out of use. OB'SOLES'CENCE, n. *-sĕns*, the state of becoming obsolete or going out of use.

OBSOLETE, a. *ŏb'sŏ-lēt* [L. *obsolētus*, grown out of use]: gone out of use; disused; out of date; in *bot.*, imperfectly developed or abortive—applied to the calyx when it is in the form of a rim; in *zool.*, applied to a part or spot, or to some distinctive character, scarcely discoverable. OB'SOLETELY, ad. *-lĭ*. OB'SOLETENESS, a. *-nĕs*, the state of being obsolete; in *zool.*, indistinctness; want of development.—SYN. of 'obsolete': old; ancient; antique; antiquated; old-fashioned; disused; neglected; obscure; rudimental.

OBSTACLE, n. *ŏb'stă-kl* [F. *obstaele;* It. *obstaculo*, an obstacle—from L. *obsta'cŭlum*—from *obsto*, I stand in the way—from *ob*, in the way; *sto*, I stand]: that which stands in the way and hinders progress; an impediment; an obstruction.—SYN.: difficulty; hindrance.

OBSTETRICS, n. *ŏb-stĕt'rĭks* [L. *obstetrix*, a midwife; *obstetricĭŭs*, obstetric—from *obsto*, I stand before or in the way]: the art and science of midwifery; the art of assisting women in child-birth, and treating their diseases during pregnancy and the puerperal state (see MIDWIFERY). OBSTET'RIC, a. *-rĭk*, pert. to midwifery. OBSTETRICIAN, n. *ŏb'stĕ-trĭsh'ăn*, an accoucheur; a midwife.

OBSTINATE, a. *ŏb'stĭ-nāt* [L. *obstĭnātus*, determined, resolute—from *ob*, in the way: *sto*, I stand; Sp. *obstinado*, headstrong]: firmly adhering to an opinion or purpose, in an ill sense; inflexible; unyielding; stubborn. OB'STINATELY, ad. *lĭ*. OB'STINATENESS, n. *-nĕs*, or OBSTINACY, n. *ŏb'stĭ-nă-sĭ*, a firm adherence to an opinion or purpose—usually unreasonable; a fixedness of mind that will not yield; stubbornness. OBSTINATION, n.

ŏb'stĭ-nā'shŭn, in OE., the quality of being obstinate.—SYN. of 'obstinate': obdurate; firm; immovable; pertinacious; resolute; heady; headstrong; contumacious; perverse; refractory; opinionated; persistent.

OBSTIPATION, n. *ŏb'stĭ-pā-shŭn* [L. *obstipārĕ*, to lean on one side, to stop up]: the act of stopping up; obstinate constipation.

OBSTREPEROUS, a. *ŏb-strĕp'ĕr-ŭs* [L. *obstrep'erus*, clamorous; *obstrepĕrĕ*, to make a noise against—from *ob*, against; *strepo*, I make a noise]: very noisy; clamorous; making a tumultuous noise; turbulent. OBSTREP'EROUSLY, ad. *-lĭ*. OBSTREP'EROUSNESS, n. *-nĕs*, the state or quality of being loudly clamorous or unruly.

OBSTRUCT, v. *ŏb-strŭkt'* [L. *obstructus*, stopped or blocked up—from *ob*, in the way; *struo*, I build]: to stop or block up; to retard or hinder; to impede; to interrupt. OBSTRUCT'ING, imp. OBSTRUCT'ED, pp.: ADJ. blocked up; impeded; hindered. OBSTRUCT'ER, n. *-ĕr*, one who obstructs. OBSTRUCTION, n. *ŏb-strŭk'shŭn* [F.—L.]: anything which hinders passage or progress; impediment. OBSTRUC'TIVE, a. *-tĭv* [F. *obstruetif*—from L. *obstructīvus*]: hindering; causing impediment: N. one who or that which hinders progress; impediment. OBSTRUC'TIVELY, ad. *lĭ*.—SYN. of 'obstruct': to clog; encumber; embarrass; fetter; retard; prevent; shackle; hinder; bar; barricade; stop; check; choke; oppose; —of 'obstruction': obstacle; bar; difficulty; barrier; check; hindrance.

OBSTRUENT, a. *ŏb'strû-ĕnt* [L. *obstruen'tem*, shutting up by building against—from *ob*, against; *struo*, I build: F. *obstruer*, to obstruct] blocking up or hindering: N. anything which obstructs the natural passages of the body.

OBTAIN, v. *ŏb-tān'* [F. *obtenir*—from L. *obtinērĕ*, to hold or keep—from *ob*, against; *tenĕō*, I hold: Sp. *obtener*, to obtain]: to get possession of; to procure; to gain; to acquire; to continue in use; to prevail; to be established in practice; in OE., to keep; to hold. OBTAIN'ING, imp. OBTAINED', pp. *-tānd'*. OBTAIN'ER, n. *-ĕr*, one who obtains. OBTAINABLE, a. *ŏb-tān'ă-bl*, that may be obtained.—SYN. of 'obtain': to attain; win; earn; get.

OBTECTED, a. *ŏb-tĕkt'ed* [L. *obtectus*, pp. of *obtego*, I cover over—*ob*, over; *tego*, I cover]: in *entom.*, term applied to a kind of insect metamorphosis, in which the growing wings, antlia, antennæ, and thoracic legs are only partially covered by the pupæ integument, being lodged in recesses on the inner surface, which make corresponding projections on the exterior, where their form and position may be recognized. It characterizes the *Lepidoptera*.

OBTEMPER, v. *ŏb-tĕm'pĕr* [F. *obtempérer*, to obey in law—from L. *obtemperārĕ*, to comply with, to obey]: to carry out, as the injunctions of an ecclesiastical court; to obey. OBTEM'PERING, imp. OBTEM'PERED, pp. *-ĕrd*.

OBTEST, v. *ŏb-tĕst'* [L. *obtestārī*, to declare as a witness, to beseech—from *ob*, against; *testis*, a witness]: to invoke; to supplicate; to entreat; to protest. OBTEST'ING, imp. OBTEST'ED, pp. OBTESTATION, n. *ŏb'-tĕs-tā'shŭn*, an adjuring; solemn entreaty.

OBTRUDE, v. *ŏb-trôd'* [L. *obtru'dĕrĕ*, to thrust against; *obtru'sŭs*, thrust against—from *ob*, against; *trudo*, I thrust]: to thrust or push in when not invited or wanted, as one's self or one's opinion; to urge or offer with unreasonable importunity. OBTRU'DING, imp. OBTRU'DED, pp. OBTRU'DER, n. *-dẽr*, one who obtrudes. OBTRUSION, n. *ŏb-trô'zhŭn*, the act of obtruding. OBTRU'SIVE, a. *-sĭv*, disposed to obtrude. OBTRU'SIVELY, ad. *-lĭ*.

OBTUND, v. *ŏb-tŭnd'* [L. *obtundĕrĕ*, to blunt or dull—from *ob*, against; *tundo*, I beat]: to blunt; to deaden; to render blunt. OBTUND'ING, imp.: N. the blunting or taking away a sharp corner. OBTUND'ED, pp.

OBTURATORS, n. plu. *ŏb'tū-rā'tẽrz* [L. *obturātus*, stopped or closed up]: in *anat.*, a name applied to two muscles which move the thigh backward and roll it upon its axis; in *surg.*, a plug for closing an aperture.

OBTUSE, a. *ŏb-tūs'* [L. *obtūsus*, blunt—from *ob*, upon; *tundo*, I beat: F. *obtus:* Sp. *obtuso*]: not pointed or acute; being greater than a right angle, or one of 90°; dull; stupid; in *bot.*, with a rounded or blunt termination. OBTUSE'LY, ad. *-lĭ*. OBTUSE'NESS, n. *-nĕs*, the state or quality of being obtuse; bluntness; dulness of understanding. OBTUSION, n. *ŏb-tū'zhŭn*, the act of dulling or making obtuse; the state of being dulled. OBTUSE-ANGLED, a. having an angle greater than a right angle. OBTUSE-ANGULAR, a. having obtuse angles.

OBVERSE, n. *ŏb'vẽrs* [L. *obversus*, turned toward or against—from *ob*, against; *versus*, turned: F. *obvers*]: the face of a coin which bears the head or principal symbol, as opposed to the other side, called the *reverse* (see NUMISMATICS): ADJ. *ŏb-vẽrs'*, bearing the face; in *bot.*, having the base narrower than the top, as in a leaf; having the point of the radicle in the seed approaching the hilum. OBVERSE'LY, ad. *-lĭ*.

OBVERT, v. *ŏb-vẽrt'* [L. *obvertĕrĕ*, to turn toward or against—from *ob*, against; *verto*, I turn]: to turn toward; to face. OBVERT'ING, imp. OBVERT'ED, pp.

OBVIATE, v. *ŏb'vĭ-āt* [L. *obvĭātus*, met in the way—from *obvĭus*, meeting in the way—from *ob*, against; *vĭă*, a way: F. *obvier*, to obviate]: *literally*, to meet in the way; to remove, as difficulties; to withstand; to prevent; to hinder. OB'VIATING, imp. OB'VIATED, pp.

OBVIOUS, a. *ŏb'vĭ-ŭs* [L. *obvĭus*, meeting in one's way, easy, not difficult (see OBVIATE)]: easily perceived or discovered; plain; evident; in *OE.*, exposed; opposed in front; liable. OB'VIOUSLY, ad. *-lĭ*. OB'VIOUSNESS, n. *-nĕs*, the state of being plain or evident.—SYN. of 'obvious': manifest; clear; apparent; visible; conspicuous.

OBVOLUTE, a. *ŏb′vŏ-lôt* [L. *obvolūtus*, wrapped round —from *ob*, around; *volvo*, I roll]: in *bot.*, having the margins of one leaf alternately overlapping those of the leaf opposite to it.

OC, *ŏk*: another form of the prefix OB, which see.

OC, n. *ŏk*: a Turkish arrow.

OCARINA, n. *ŏk-ar-ē′na* [It.]: in *mus.*, series of seven musical instruments made of terra-cotta pierced with small holes; invented by a company of performers calling themselves the Mountaineers of the Apennines With these instruments, of soft and sweet, yet 'travelling,' quality of tone, operatic melodies with simply harmonized accompaniments were given.

OCCAM, *ŏk′kam*, WILLIAM OF, surnamed *Doctor Singularis et Invincibilis*: famous schoolman: b. England, at the village of Ockham, co. of Surrey, near the end of the 13th c.; d. about 1349. Very little is known of his early life. He is said to have been induced by the Franciscans to enter their order while a boy, to have been sent by them to Merton College, Oxford, and to have held several benefices in his native country, which he soon resigned. Early in the 14th c., it is supposed he proceeded to Paris, where he attended the lectures of John Duns Scotus, of whose philosophy he was afterward the most formidable opponent. Here he soon became prominent by the boldness of his ecclesiastical views. Philippe *le Bel*, King of France, having forbidden Pope Boniface VIII. to levy contributions in his dominions, the latter, in retaliation, excommunicated him. O. rushed to the defense of the monarch, and, in his *Disputatio inter Clericum et Militem, super Potestate Prælatis Ecclesiæ atque Principibus Terrarum Commissa*, denies that the popes have authority in temporal affairs, and boldly declares that all who claim for them such authority ought to be expelled from the church as heretics. Meanwhile, from being a listener, he had become a lecturer, in philosophy. The system which he advocated—for he was not its originator—is known as *Nominalism* (q.v.); but it had never before received so rigorously logical and rational a treatment—hence his epithet of *Invincibilis*. The work in which his views are set forth is *Expositio Aurea, et admodum utilis super totam Artem Veterem*. It contains a series of commentaries upon the *Isagoge* of Porphyry, and on the *Categories* and *Interpretation* of Aristotle, with a special treatise headed *Tractatus Communitatum Porphyrii*, and a theological opusculum on Predestination. It is intended as a demolition of the moderns—i.e., the scholastics—and shows that in their method they have completely departed from the principles and methods of the great Stagirite, for whom, like every sound and solid thinker, he shows the deepest respect and admiration. About 1320,1 he again plunged into ecclesiastical controversy. A certain Narbonese priest, having affirmed that Jesus Christ and his apostles held everything in com-

mon, and that every ecclesiastical possession is a modern abuse, was pounced upon by the inquisitors, and defended by a certain Berenger Talon, a Franciscan monk of Perpignan. But Berenger's defense of apostolical poverty was naturally very disagreeable to the pope, John XXII., who therefore condemned it. Berenger was, however, vigorously supported by his order, and, among others, by Michael de Cesena, gen.-superior, by Bonagratia of Bergamo, and by William of Occam, who attacked the pope with great vehemence and trenchant logic. Shortly afterward they were arrested as favorers of heresy, and imprisoned in Avignon. But while their trial was proceeding, Michael de Cesena and Occam, knowing what little mercy or justice they had to expect from their accusers and judges, made their escape to the Mediterranean, and were received at a little distance off shore on board a galley of Ludwig, King of Bavaria, patron of the Franciscan antipope, Peter of Corbaras, and one of the most powerful sovereigns in Europe. The remainder of Occam's life was spent at Munich, where, safe from the machinations of his enemies, he continued to assail at once the errors of papistry in religion and of realism in philosophy. He died probably at Munich.

Occam was probably the first logician and the most rational philosopher among the whole body of schoolmen. His practicalness, vigorous common-sense, and wholesome incredulity show him the countryman of Locke and Hobbes. 'Occam's razor' is a celebrated phrase applied to the logical maxim that only one hypothesis should be employed at a time in explaining facts. Besides the works above mentioned, Occam's principal writings are: *Dialogus in tres Partes distinctus, quarum prima de Hæreticis, secunda de Erroribus Joannis XXII., tertia de Potestate Papæ, Coneiliorum et Imperatoris; Opus Nonaginta Dierum contra Errores Joannis XXII.; Compendium Errorum Joannis Papæ XXII.; Decisiones Octo Quæstionum de Potestate summi Pontifieis; Super Quatuor Libros Sententiarum Subtilissimæ Quæstiones earumque Decisiones* (based on Peter the Lombard's famous *Sententiæ*, and containing nearly the entire theology of Occam: these *Decisiones* were long almost as renowned as the *Sententiæ* which gave them birth); *Antiloquium Theologicum; Summa Logices ad Adamum:* and *Major Summa Logiees.*—See Luke Wadding's *Scriptores Ordinis Minorum* (1650); Hauréau's *De la Philisophie Scolastique* (1848); new ed. (1873); and the works of Kaulich, Stöckl, Prantl, and Erdmann.

OCCASION, n. *ŏk-kā′zhŭn* [F. *occasion*—from L. *occāsiōnem*, an occasion, an opportunity—from *ob*, in the way; *cāsus*, that which happens, an accident: It. *occasione*]: an occurrence; an incident; an opportunity; favorable time or season; incidental need: V. to cause; to produce; to give rise to; to bring about. OCCA′SIONING, imp. OCCA′SIONED, pp. *-zhŭnd.* OCCA′SIONER, n. *-ẽr*, one who occasions or causes. OCCA′SIONAL, a. *-ăl*,

occurring at times; happening as opportunities occur; produced in connection with some special event; in *metaph.*, acting in the way of assistance. OCCA'SIONALLY, ad. *-lĭ.* OCCA'SIVE, a. *-sĭv,* pert. to the falling or setting sun; western. ON OCCASION, from time to time; as it may happen.—SYN. of 'occasion, n.': need; necessity; use; casualty; chance; convenience; requirement; exigency.

OCCA'SIONALISM, or the DOCTRINE OF OCCASIONAL CAUSES (see CAUSE): philosophical system suggested by Descartes and fully developed by his disciples, Geulinx and Malebranche (q.v.). It attempts to explain the action of mind on matter, or, more correctly, the combined, or at least the synchronous, action of both. It is a palpable fact that certain actions or modifications of the body are accompanied by corresponding acts of mind, and *vice versa.* This fact, though it presents no difficulty to the popular conception, according to which each is supposed to act directly upon the other—body upon mind, and mind upon body—has long been to philosophers a subject of deep speculation. It is difficult to conceive the possibility of any *direct* mutual interaction of substances so dissimilar, or, rather, so disparate; and more than one system has been devised for explanation of the problem as to their relations in operations attributable to both. According to Descartes and the Occasionalists, the action of the mind is not and cannot be *the cause* of the corresponding action of the body. But they hold that, whenever any action of the mind takes place, God directly produces, in connection with it and by reason of it, a corresponding action of the body; and in like manner, conversely, they explain the coincident or synchronous actions of the body and the mind. It was in opposition to this view that Leibnitz, believing the Cartesian system to be open to nearly equal difficulties with that of the direct action, devised his system of *Preëstablished Harmony.* (See LEIBNITZ.) His real objection to the Occasionalist hypothesis is that it supposes a perpetual action of God upon creatures, and is really only a modification of the system of 'direct assistance.'

OCCIDENT, n. *ŏk'sĭ-dĕnt* [F. *occident,* west—from L. *occĭden'tem,* falling or going down—from *ob,* in the way; *cădo,* I fall: It. *occidente*]: the quarter where the sun goes down; the west. OC'CIDENT'AL, a. *-dĕnt'ăl,* western.

OCCIPUT, n. *ŏk'sĭ-pŭt* [L. *occĭput,* the back part of the head—from *ob,* over, against; *caput,* the head]: the hinder part of the head or skull—the forepart being called the *sinciput.* OCCIPITAL, a. *ŏk-sĭp'ĭ-tăl* [F.—L.]: pert. to the back part of the head or skull.

OCCLUDED, a. *ŏk-klô'dĕd* [L. *occludĕrē,* to shut or close up]: inclosed; shut in. OCCLU'SION, n. *-zhŭn* [L.

occlūsus, shut up]: in *chem.*, the absorption of gases within metals, as hydrogen by palladium.

OCCULT, a. *ŏk-kŭlt'* [F. *occulte*—from L. *occultus*, hidden, concealed: It. *occulto*]: concealed; secret; hidden from the eye or understanding; unknown; undiscoverable. OCCULTISM, n. *ŏk-kŭlt'ĭzm* [Eng. *occult*]: system of theosophy practiced in the East, specially in India. Its adepts claim to possess secrets of an ancient religion and philosophy, by which they are enabled to produce seemingly miraculous effects by purely natural means: see THEOSOPHY. OCCULT'IST, n. one versed in the mysteries of occultism. OCCULT'LY, ad. *-lĭ*. OCCULT'NESS, n. *-nĕs*, the state of being occult. OCCULTATION, n. *ŏk'kŭl-tā-shŭn* [F.—L.]: the concealing of a heavenly body from our sight by the intervention of some other one (see below). OCCULT'ED, a. hidden, as a star; secret. OCCULT SCIENCES, certain so-called sciences of the middle ages, as magic, alchemy, and astrology.

OCCULTA'TION: term meaning *eclipse;* but, while eclipse is confined by usage to the obscuration of the sun by the moon and of the moon by the earth's shadow, occultation is restricted to the eclipse of stars or planets by the moon. Occultations are frequent; they are confined to a belt of the heavens about 10° 17½′ wide, parallel to and on both sides of the equinoctial, and extending to equal distances n. and s. of it, being the belt within which the moon's orbit lies. These phenomena serve as data for measurement of the moon's parallax; they are employed also occasionally in calculation of longitudes. As the moon moves in her orbit from w. to e., the O. of a star is made at the moon's eastern limb, and the star emerges on the western limb. When a star is occulted by the dark limb of the moon (a phenomenon which can occur only between new moon and full moon), it appears to an observer as if it were suddenly extinguished, and this appearance is most deceptive when the moon is only a few days old. When an O. occurs between full moon and new moon, the reappearance of the star at the outer edge of the dark limb produces an equally startling effect. 'It has often been remarked,' says Herschel, 'that, when a star is being occulted by the moon, it appears to advance actually *upon* and *within* the edge of the disk before it disappears, and that sometimes to a considerable depth.' This phenomenon he considers an optical illusion, though he admits the possibility of its being caused by the existence of deep fissures in the moon's substance. Occultations of stars by planets and their satellites are rarer than lunar occultations, and still more infrequent are occultations of one planet by another. Occultations are calculated in the same way as eclipses; but the calculation is simplified in the case of the fixed stars, from their lack of sensible motion, semidiameter, and parallax.

OCCULT'ISM: see THEOSOPHY.

OCCUM (or Occom), *ŏk'kŭm*, Sam(p)son: Indian preacher: about 1723–1792, July; b. Mohegan, near Norwich, Conn. In 1739 a religious interest followed the preaching of the gospel among the Indians, and O. was among the converts. He learned to read the Bible, and, at the age of 19, taught an Indian school at Lebanon, Conn., continuing 4 years, and afterward at New London; later, for 11 years, he taught a similar school at Montauk, L. I., at the same time preaching to neighboring tribes with good results. He was ordained by the Suffolk presbytery 1759. In 1766 he was sent to England, and preached to throngs in various places. Large gifts were the result, and his teaching, on his return, was transferred to an Indian school connected with the beginning of Dartmouth College; but he travelled widely in his work among his fellow-aborigines. In 1786 he was teaching at Brotherton, near Utica, N. Y., his school composed of removed Stockbridge and Mohegan Indians. There is an account of the Montauk Indians by him, which, with his sermon at the execution of Moses Paul, an Indian, at New Haven, Conn., are in the *Mass. Hist. Collections*, 1st series, X. Further notices of him are in Dwight's *Travels* and Gillett's *Hist. Presb. Chh. in U. S. A.*

OC'CUPANCY, in Law: the taking or holding possession of those things which belong to nobody: this was the primitive method of acquiring property, but has since been restricted and curtailed by the laws of civilized society. Both real and personal property may be acquired by O. The right of O. to real property extended originally to the single instance where a person owning an estate only during the life of some other person died during the life of that person; in such a case there was no one who had a legal claim to the property. The person who was to succeed the life-tenant could not legally take the property, because the life-estate had not expired; the heir of the life-tenant could not take it, because the life-tenant's estate was not one of inheritance; the personal representatives of the life-tenant had no claim to it, as it was n t considered personal property. The result was that any one who might first take possession of it became the owner of it by O., and was called the general occupant. This doctrine of general O. has now been practically abolished in England, and in most of the United States, by statutes providing that this interest remaining after the death of the tenant during the life of another shall form part of the personal assets in the hands of the executors or administrators; in some states, the estate is, by statute, descendible as real estate.

The personal things that may be acquired by O. are: 1. The goods and chattels belonging to alien enemies: these may be seized and no restitution compelled; but the statutes of the United States and of England require that, in order to vest the property of a capture in the captors, a legal sentence of condemnation should be

passed by a prize court. 2. Whatever movables are found upon the face of the earth or in the sea, and are unclaimed by any owner, are supposed to be abandoned by the last proprietor, unless they have been thrown into the sea in peril of shipwreck, to save the vessel, or have been lost in a shipwreck. 3. The benefits of the elements, like the light, air, and water, may be acquired by O.: this is known in England as the doctrine of 'ancient lights;' this has been rejected in the United States, and no property can be there acquired in light and air. 4. Wild animals become the property of the captor as soon as they are seized, and continue his property so long as they remain in his possession; but, once having regained their liberty, the property of the captor ceases in them, and they belong to him who first again seizes them. 5. The doctrine of property arising from accession is grounded on this right of O.: thus, if any substance received an accession by natural or artificial means, as by the growth of vegetables, the pregnancy of animals, or the conversion of wood or metals into utensils, the original owner of the thing was entitled to own it in its improved state, by his right of possession of it. 6. In case of the wilful and fraudulent confusion or admixture of goods of two persons, so that the shares of each are incapable of being distinguished, the right of O. in such goods is held to be in him who has not interfered; and the person causing the mixture loses his property in the goods. 7. As the right of O. is supposed by some authorities to be founded on the personal labor and invention of the occupant, they have placed the rights which authors have in their unpublished manuscripts among those things personal that are acquired by O.: this right of literary property is now to a greater or less extent protected by copyright statutes in all civilized countries.

OCCUPY, v. *ŏk'kū-pī* [F. *occuper*, to occupy—from L. *occupārĕ*, to take possession of—from *ob*, against; *capĭō*, I take: It. *occupare*]: to take possession of; to hold or keep for use; to take up, as room or space; to busy one's self; to employ, as time; to use; to engage, as time and attention; to follow a business. OC'CUPYING, imp. OC'CUPIED, pp. *-pīd.* OC'CUPIER, n. *-pī-ėr*, or OC'CUPANT, n. *-pănt* [F.—L.]: one who has possession. OC'CUPANCY, n. *-păn-sĭ*, the act of taking or holding possession. OC'CUPA'TION, n. *-pā'shŭn* [F.—L.]: the act or state of occupying; that which engages the time and attention; employment; business; trade. OCCUPATION BRIDGE, a bridge carried over or under a line of railway, to connect the parts of a farm or estate severed by the line. OCCUPATION ROAD, private road on an estate or farm.—SYN. of 'occupation': occupancy; tenure; use; possession; calling; office; profession; avocation; engagement; vocation.

OCCUR, v. *ŏk-kėr'* [F. *occurrer*, to occur—from L. *occurrĕrĕ*, to run or come to meet—from *ob*, in the way; *curro*, I run]: to happen: to be met with; to be presented to the mind or memory; to appear here and there. OCCURRING, imp. *ŏk-kėr'rĭng*. OCCURRED', pp. *-kėrd'*. OCCURRENCE, n. *ŏk-kėr'rĕns* [F.—L.]: that which happens; an incident; any single event. OCCUR'RENT, n. *-rĕnt* [OF.—L.]: in OE., that which happens; an event; chance.

OCEAN, n. *ō'shŭn* [OF. *ocean*—from L. *occănus:* Gr. *ōkĕănos*, the great sea: It. *occano:* perhaps Gr. *ōkus*, swift; *naō*, I flow]: vast expanse of salt water; the main—like SEA, in its general acceptation, denoting the body of salt water that separates continent from continent, and is the receptacle for the waters of rivers. The surface of the ocean is about three-fifths of the whole surface of the earth. Although no portion of it is completely detached from the rest, the intervening continents and islands mark it off into divisions, distinguished by special names; the *Atlantic Ocean* (q.v.), between America and Europe and Africa; the *Pacific Ocean* (q.v.), between America and Asia; the *Indian Ocean* (q.v.), s. of Asia, and limited e. and w. by Australasia and s. Africa; the *Arctic Ocean* (q.v.), surrounding the n. pole; the *Antarctic Ocean* (q.v.), surrounding the s. pole. For general features and characteristics of the ocean, see SEA. Figuratively, any very great or immense expanse, as the *ocean* of eternity: ADJ. pert. to the great expanse of salt water. OCEANIC, a. *ō'shĕ-ăn'ĭk*, relating to the ocean; occurring in, or produced by, the ocean. OCEANIDES, n. plu. *ō'sē-ăn'ĭ-dēz*, sea-nymphs, daughters of OCEANUS, *ō-sē'â-nŭs*, a sea-god; called sometimes Naiads.

OCEAN GROVE: N. J., town in Monmouth County; on the Atlantic Ocean, and on the Central of New Jersey and the Pennsylvania Railroad; about 30 miles south of New York. It is a famous summer resort on account of its fine beach and the ease of access from New York, Philadelphia, and other cities. It adjoins Asbury Park (q.v.); Wesley Lake is on the boundary. The Ocean Grove Camp Meeting Association of the Methodist Episcopal Church controls the town, and regulates its laws. The sale of intoxicants and tobacco and theatrical performances are prohibited. The Sunday laws are strict and rigidly enforced. The prominent buildings are the Auditorium, which seats 10,000 persons, cost $75,000, and was dedicated Aug. 9, 1894; the public school building, and the postoffice. Religious meetings are held in the Auditorium. The school building, called the Neptune Township High School, cost $72,000. The association owns and operates the electric light plant and the waterworks. The association was organized in 1869; but the first permanent building was not erected until 1875, a wooden frame covered with green boughs was its appearance when first used. In 1874 a stand for the

speakers had been erected, and the audiences sat on temporary seats made by placing planks on trestles. There are large hotels and boarding houses and a large number of summer cottages. In the summer months the population varies from 20,000 to 30,000. Pop. 4,440.

OCEANIA, *ō-shē-â'nĭ-a*, or OCEANICA, *ō-shē-ăn'ĕ-ka:* the fifth division of the globe, comprising all the islands which intervene between the s.e. shores of Asia and the w. shores of America. Some geographers divide it into three great sections—Malay Archipelago (q.v.) or Malaysia: Australasia (q.v.) or Melanesia; and Polynesia (q.v.). Others make five divisions—Polynesia, Micronesia, Melanesia, Australasia, Malaysia.

OCEANS: The sea covers three-quarters of the earth's surface, being, as Kline has said, the 'great reservoir for all the moisture which circulates through the world. From it arise all the waters carried over the land, and to it this water returns through myriad channels.' Like the dry land, the oceans constitute a world in themselves, for countless kinds of animal and vegetable life find home and nourishment within their boundaries.

For geographical and commercial convenience, this great sea, or body of water which entirely surrounds the lands of the world, has been divided into five distinct divisions, each of which is known as an 'ocean.' Thus, the Atlantic Ocean lies between the two polar circles, Europe, Africa, the meridian of Needle Cape, America, and the meridian of Cape Horn. The Indian Ocean is bounded by the southern arctic circle, the meridian of South Cape, in Tasmania, and the meridian of Needle Cape. The Pacific Ocean lies between Behring's Straits in the north, and the polar circle in the south; while its eastern and western boundaries correspond to those of the Atlantic and Indian Oceans. The Arctic and Antarctic Oceans, of course, are confined to their respective polar circles.

Although this question of the division of the great sea into different oceans is one of the oldest and most difficult problems in geography, it was not until 1845, when the Royal Geographical Commission met in London to consider this subject, that the present boundaries were agreed upon.

Dimensions of the Oceans.—As now bounded the estimated area of the Atlantic Ocean is 24,536,000 sq. miles, being less than half the size of the Pacific Ocean. The portion that is enclosed by land on both sides is about 7,000 miles long. At the point of its greatest breadth it is about 4,400 miles wide, while, at its narrowest part, it is almost 1,600 miles in width. It encloses many large islands, and is also remarkable for the great inland seas that connect with it. Among these are the Baltic, the Gulf of Mexico, the Caribbean Sea, and the Mediterranean.

The Indian Ocean contains an area of about 17,084,000 sq. miles. Its length from north to south is somewhat

OCEANIA
SCALE OF MILES
0 200 400 600 800 1000
Tropic of Cancer
Tropic of Capricorn
Equator
Longitude East from Greenwich
Longitude West from Greenwich
CHINESE EMPIRE
JAPAN
KOREA
PHILIPPINE ISLANDS
NETHERLANDS EAST INDIA
AUSTRALIA
NEW ZEALAND
HAWAII (To United States)
HAWAIIAN OR SANDWICH ISLANDS
MICRONESIA
MELANESIA
POLYNESIA
PACIFIC OCEAN
UNITED STATES
MEXICO
CENTRAL POLYNESIAN SPORADES
CORAL SEA
PEKING
Yokohama
Nagasaki
Hongkong
Manila
Sydney
Melbourne
Auckland
San Francisco
Honolulu
Portland
Minneapolis
Chicago
Omaha
St. Louis
Memphis
Jackson
New Orleans
Galveston
Tampico
Gulf of Mexico
Acapulco
Manzanillo
Guaymas
Monterey
Salt Lake City
Sacramento
Santa Fe
El Paso
Austin
S. Diego
C. San Lucas
S. Blas
Revilla Gigedo Is
Clipperton
Duncan I.
Gallego
Marquesas Is.
Society Is.
Taumotu or Low Archipelago
Pitcairn
Ducie
Sala-y Gomez
Easter I.
Cook or Hervey Is.
Tubua or Austral Is.
Manahiki Is.
Tokelau or Union Is.
Phoenix Is.
Gilbert Is.
Lagunes or Ellice Is.
Solomon Is.
Sta Cruz Is.
New Hebrides
Fiji Islands
Tonga or Friendly Is
Manua, Samoa or Navigator Is.
New Caledonia
Loyalty Is
Norfolk I.
Kermaoec Is
Chatham I.
Palmyra I.
Washington I.
Fanning I.
Howland I.
Baker I.
Wake I.
Midway I.
Marshall Islands
Caroline Islands
Mariana or Laopones
Guam
Bonin Is.
Volcano Is.
Loo-Choo or Riu Kiu Is.
Formosa
Hainan
Borneo
Celebes
Java
Sumatra
Sumbawa
Flores
Timor
Lombok
Sumba
Molucca Is.
Arrou Is.
Aru Is.
Kaiser Wilhelms Land
Bismarck Archi.
New Ireland
New Britain
Louisiade Archi.
Bougainville
Papua or New Guinea
Torres Str.
Gulf of Carpentaria
Arafura Sea
Timor Sea
Java Sea
Banda Sea
Celebes Sea
Sulu Sea
Yellow Sea
China Sea
Great Australian Bight
Spencer Gulf
Port Augusta
Adelaide
Port Darwin
Cooktown
Townsville
Port Denison
Rockhampton
Brisbane
Newcastle
Charleville
Bourke
Broome
Wyndham
Derby
Hughenden
Queensland
Western Territory
South Australia
New South Wales
Victoria
Tasmania
Perth
Albany
Geraldton
Kalgoorlie
Menzies
Oodnadatta
Nunnine
Launceston
Hobart
Bass Str.
Melbourne
Portland
Barnie
Wellington
Napier
New Plymouth
North I.
South I.
Nelson
Christchurch
Dunedin
Hokitika
North C.
C. Howe
C. Leeuwin
C. York
North West C.
Bluff Hd.
Yangtze R.
Hoang Ho R.
Canton
Swatau
Foochow
Kinchau
Kiaochau
Weihaiwei
Kirin
Mukden
Tientsin
Pt. Arthur
Ninchwang
Vladivostok
Sakhalin I.
Kuril Is.
Yezo
Hakodate
Fukujama
Hondo
Tokio
Kioto
Osaka
Shikoku
Kiushu
Lanchau
Nanking
Shanghai
Hankow
Hangchau
Fuchiau
Amoy
Swatau
Lingayen
Laoag
C. Engano
Luzon
Mindoro
Panay
Samar
Leyte
Palawan
Mindanao
Pelew Is.
Sandakan
Selangan
Brunei
Kuching
Sarawak
Pulas
Bonin
Saigon
Tonkin
Hue
Gulf of Tonkin
Hainan
Laos
Cambodia
Siam
Burma
Assam
Bengal
Hindustan
Arabian Sea
Persian Gulf
Bombay
Calcutta
Madras
Ceylon
Colombo
Malabar Coast
Coromandel Coast
Ganges R.
Indus R.
Himalaya Mts
Afghanistan
Persia
Arabia
Aden
Red Sea
Suez Canal
Egypt
Nile R.
Cairo
Alexandria
Mediterranean Sea
Europe
Asia
Africa
Atlantic Ocean
Pacific Ocean
Indian Ocean
Arctic Ocean
Antarctic Ocean
Antarctica
Greenland
Iceland
Scandinavia
Russia
Germany
France
Spain
Portugal
Italy
Turkey
Black Sea
Caspian Sea
Aral Sea
Lake Baikal
Siberia
Mongolia
Gobi Desert
Tibet
Himalaya Mts
Yangtze R.
Yellow R.
Hoang Ho R.
Mekong R.
Irrawaddy R.
Ganges R.
Indus R.
Euphrates R.
Tigris R.
Nile R.
Congo R.
Niger R.
Zambezi R.
Orange R.
Murray R.
Darling R.
Great Barrier Reef
Coral Sea
Tasman Sea
Arafura Sea
Timor Sea
Java Sea
Banda Sea
Celebes Sea
Sulu Sea
Yellow Sea
China Sea
Great Australian Bight
Spencer Gulf
Port Augusta
Adelaide
Port Darwin
Cooktown
Townsville
Port Denison
Rockhampton
Brisbane
Newcastle
Charleville
Bourke
Broome
Wyndham
Derby
Hughenden
Queensland
Western Territory
South Australia
New South Wales
Victoria
Tasmania
Perth
Albany
Geraldton
Kalgoorlie
Menzies
Oodnadatta
Nunnine
Launceston
Hobart
Bass Str.
Melbourne
Portland
Barnie
Wellington
Napier
New Plymouth
North I.
South I.
Nelson
Christchurch
Dunedin
Hokitika
North C.
C. Howe
C. Leeuwin
C. York
North West C.
Bluff Hd.

in excess of 3,500 miles. In width it varies from about 6,000 miles (its breadth between South Cape and Cape of Good Hope) and 4,000 miles (the distance between the coast of Arabia and that of Sumatra and Malacca).

The area of the Pacific Ocean is variously estimated at from 50,500,000 to 60,000,000 sq. miles, and is undoubtedly in excess of all the dry land in the world. At the equator, which is its widest point, it is more than 10,000 miles in width. Many geographical authorities divide this ocean into two parts, one being known as 'North,' the other as 'South' Pacific. In this case, the boundary line between the two is found at the equator.

The Arctic Ocean comprises all the waters within the Arctic circle, but, owing to the fact that its exploration is practically impossible, comparatively little is known about it. Its area, however, is estimated at about 4,750,000 sq. miles. The southern Arctic, or Antarctic Ocean, occupies a similar position at the South Pole, and but little of its area has been thoroughly explored. According to the best authorities, this area exceeds that of the Atlantic Ocean, being about 30,000,000 sq. miles.

Depths of Ocean Waters.—The bottom of these seas is by no means horizontal, or even of regular formation. In fact, the bed of the sea corresponds to the dry land in that it possesses its mountains and its valleys; its plateaux and its plains. Thus, Kline has estimated that a fall in its level of 1,094 fathoms would diminish the width of the Atlantic Ocean more than half, would leave the Gulf of Mexico completely dry, and leave nothing more than an elongated lake to show where the Caribbean Sea had been located. Moreover, according to Herschel, if the present levels should be lowered by 2,187 fathoms, a continent separated from Europe and America by two narrow channels, and extending over a space of from 1,550 to 1,860 miles, would stretch into the torrid zone, presenting the same peninsular conformation and southerly direction now shown by Greenland, Italy, India, etc. A lowering of 3,280 fathoms would completely unite the Old and the New World, forming a union between Ireland and Newfoundland, and of the central Atlantic there would remain but a narrow strip of water, of less extent than the Mediterranean, in front of the Antilles and Guiana, while, if these waters were lowered by 4,375 fathoms, even the northern portion of the Atlantic would be reduced to a small, triangular sea, somewhat resembling the Caspian, between the Azores, Newfoundland, and Bermuda.

Guyot describes the basin of the Atlantic as a 'deep valley, which runs with an average depth of 20,000 feet, or more, along and parallel to the coast of the New World. A large swell, over 10,000 feet higher, bearing, perhaps, the islands of Tristan d'Acunha, St. Helena, Ascension, and, in the North Atlantic, the Azores, separates it from another valley, 15,000 feet deep, which stretches along and close to the coast of Africa. Both valleys rise northward and are confounded in one basin

on the so-called telegraphic plateau between Newfoundland and Ireland, where the average depth is about 12,000 feet, and the greatest not more than 2,400 fathoms, or 14,000 feet.'

It is, of course, impossible to state that the deepest depression in the Atlantic has yet been sounded. At present 27,366 feet is generally accepted as a reasonable estimate of great depth, although Capt. Denham's sounding of 7,600 fathoms, or 45,600 feet, has been accepted by Bischof and other eminent geologists, while Herschel estimates that, if the mean depth of the north basin is 2,187 fathoms, that of the south basin must be about 4,920 fathoms, which would make the greatest depth of the ocean in excess of 29,000 feet.

The conditions that exist in the bed of the Atlantic are, to a certain extent, similar to those of the Pacific Ocean. There, too, are the highlands and the lowlands, and the mountainous ridges that descend to deep valleys. The question of extreme depth, however, is almost entirely a matter of estimate, but it is believed that, in its deepest spot, the Pacific will exceed 29,000 feet. The various authentic soundings that have been taken show a depth of 2,700 fathoms not far from the coast of California, and one of 3,609 fathoms between the Philippine and the Marianne Islands. Moreover Capt. Ringgold, in sounding just south of the East India Islands, found a depth of 8¾ miles. 'Thus,' said Reclus, 'one might throw into this abyss of the sea not only Pelion or Ossa, but Gaourisankar itself, the highest mountain of the globe; and even if on its peak Mount Blanc were set up, the summit of this colossus of the continent of Europe would not reach to the surface of the water.'

The Indian Ocean is undoubtedly very deep in many parts, but, from the few authentic soundings that have been taken, scientists have estimated 18,582 feet to be its greatest depth. In the Arctic Ocean a depth of 1,547 fathoms has been sounded between Iceland and Greenland, while a depth of nearly 2,000 fathoms has been found in Baffin's Straits. Less is known about the depth of the Antarctic Ocean, although 1,722 fathoms have been found.

Color, Temperature, and Saltiness of Ocean Waters.—The water of the ocean is neither colorless nor always of one color. In fact, owing to the properties which it possesses, and by which it not only reflects light but also allows the rays to penetrate to a great depth, it presents many colors and tints. Ordinarily blue, it varies to green, and from green to yellow and brown, while Tuckey asserts that, at the bottom, it is an intense red. Thus, while in the Gulf of Gascony the water is a sombre green, in the Gulf of Lyons it is a magnificent azure, while the wonderful blue waters that attract so many visitors to the grotto of Capri indicates to what intensity of color the water of the Mediterranean can attain.

While the temperature of ocean waters is still a matter for investigation, so far as the surface is concerned, it

presents, on an average, in all climates, the same degree of heat as the superincumbent atmosphere. Thus, starting at the polar circle and following it to the equatorial zone, the increasing warmth of the temperature may be traced in regular gradations, from the point of freezing, which exists in the Arctic, to 68° and 77° Fahr. under the tropics, and, according to Fitzroy, to 86° and even above 90° Fahr. in the Pacific, the Red Sea, and the Indian Ocean. From the surface, however, the temperature decreases with every increase in depth. In the ocean abysses it becomes very low indeed, but, even at the greatest known depths, it does not reach the freezing point. Although fresh water reaches its greatest weight and density at a temperature of 38° Fahr., salt water contracts down to the freezing point, which is about three degrees lower than the freezing point of distilled water. In those parts of the sea that have free connection with the Arctic Ocean the temperature maintains a lower range than would otherwise attain. In the open seas the variations of the temperature are very slight, often showing a difference of only about three degrees, while even the variations due to the changing seasons is only perceptible in higher latitudes. In inland seas, and near the coast, this evenness of the sea's temperature is less conspicuous.

The quantity of salt contained in sea water is not everywhere the same. The average, however, is estimated at about three per cent. As fully three-quarters of this is the ordinary cooking salt, it has been estimated that the total amount of this commodity contained in all the oceans would measure 3,645 cubic miles, if it could be gathered into one solid block.

The greatest quantities of salt are found in those parts of the sea where the evaporation is greatest, and where there is a comparatively small admixture of fresh water. Thus, there is a great amount of salt in the Red Sea, and the Mediterranean has considerable of it, especially along the hot coast of Africa, but the Baltic Sea has so little that, in some places, the water is almost fresh.

Ocean Currents.—One of the most interesting phases of the study of the sea is the streams, or currents, which flow through the oceans in clearly defined channels that show that, in bulk at least, they are far greater than any of the rivers of the mainland. One carries the equatorial heat to higher latitudes; another brings the cold of the Arctic down to the sunnier regions of the globe. Some of them are so near the surface of the sea that mariners can sometimes trace the flow of their waters, while others are far below, some being at the very bottom of the ocean's bed itself. Thus, the sea's currents are divided into surface and under-currents; they are also divided into cold and warm currents, according to their temperature, and into constant and intermittent currents, according to their duration. Currents that chiefly effect the surface of the sea are known as 'drift' currents.

The principal currents of the Atlantic Ocean are the equatorial current and the Gulf Stream. The former rises in the Gulf of Guinea, and flows westward with a velocity of from 30 to 70 miles a day. When near Cape St. Roque it divides into two branches. One continues southward along the coast of Brazil, the other enters the Caribbean Sea, from which it soon emerges in the form of the Gulf Stream. Passing around the western end of Cuba, and through the Florida Strait, it follows the coast of the United States to the banks of Newfoundland, where it turns eastward, and crosses the Atlantic to the Azores. There it once more branches into two divisions. One washes the shores of the British Islands, while the other proceeds southward to the tropical waters of Africa. At its narrowest part the gulf stream is 50 miles in width, and its velocity varies, according to its width, from 1½ to 5 miles an hour.

As the currents of the Pacific Ocean are much larger than those of the Atlantic, they are less strongly marked. The Antarcic drift current enters the Pacific from the south polar circle. It passes north to New Zealand, where it turns eastward to the west coast of Patagonia. Here it divides into two branches. One goes southerly, and, rounding Cape Horn, enters the Atlantic; the other, which is known as the Peruvian, or Humboldt current, follows the coast of South America northward to the Isthmus of Panama, where it turns west, and, under the name of the South Equatorial current, it crosses the entire width of the Pacific Ocean. At the coast of Australia it divides again, this time into three parts, one branch becoming the Australian current; the second, after circulating among the islands, is lost in the Malay Archipelago, while the third passes the coast of China, and, turning north, touches Japan, where it becomes the Japanese current, a stream that crosses the Pacific again, to merge, finally, in the North Equatorial current. Between the North and South Equatorial currents there is another which takes an exactly opposite course. This is called the equatorial counter-current.

The equatorial current, connecting the Pacific with the Atlantic, flows through the southern part of the Indian Ocean, its course being from east to west. Its rate of speed varies with the seasons, but, in its narrow parts, it sometimes attains a speed of 60 miles a day. There are other fast currents running through the Indian Ocean, the most important being a southwest current that flows along the coast of Africa towards the Mozambique Channel at a rate exceeding 28 miles a day. This finally merges into the Cape current at Cape Padron.

The Waves.—As the conformation of the waves is largely the effect of the action of the winds, they must vary greatly from time to time, and yet, even under the same conditions, the height of the waves would not be the same in all seas. They are greatest, for example,

where the basin of the sea is deepest in proportion to the exposure of its surface, and they continue to increase in size as the water grows lighter and less salty. According to Reclus, the 'waves of the Caspian are not to be compared with those of the Mediterranean, which, again, are greatly exceeded in height by those of the North Atlantic; and these latter, in their turn, are surpassed by those of the Antarctic.' In the Antarctic, Wilkes measured waves that were 10½ yards high. In the Indian Ocean they sometimes rise to a height of 15¾ yards, while Scoresby speaks of the 24-foot waves seen on the Atlantic as 'a terrible sea.'

The waves also vary considerably in length and rapidity of movement. In a troubled sea they may attain a length of more than 105 yards, while, upon extraordinary occasions they have been estimated at 300 to 400 yards in length. With a moderate wind they sometimes advance as rapidly as 13 miles an hour, but this ratio becomes much greater as a storm increases, although the speed rarely exceeds 45 miles an hour. As may be imagined, therefore, the pressure exerted by these great masses of water, hurled with such impetus, is something tremendous. Stephenson's calculation of the force of the sea dashed against the Bell Rock light-house was 17 tons for every square yard, and it has been estimated that even this pressure is frequently exceeded.

Ocean Life.—The sea, like the land, has its multitude of plant species, some of the tracts of vegetation being many miles in extent. It has its abundance of animal life, too, for, as Humboldt said, many years ago, it is the principal centre of animal organisms. Even the coral, upon which new lands are constantly being constructed, is the direct result of organic life. Among the 6,000 or more species of fish known to science, fully three-quarters of the whole number are inhabitants of the salt water, and each has its own habitat, or area of distribution, the lines of which are probably defined by the composition and temperature of the water. Moreover, according to Kline, 'the great luxuriance and diversity of animal and vegetable life which is to be seen on most ocean coasts is not, as a rule, restricted to an inconsiderable depth, but extends in undiminished fulness to at least 300, and, in many cases to 450 or 600 yards below the surface. The plant life, so richly represented in the first 150 yards by the varied forms of algæ, appears at a depth of 300 yards to decrease greatly, both in varieties and in the number of individuals. In depths of from 375 to 475 yards it is very scantily represented, and certain isloated forms of weed seldom descend below 625 yards. Animal life, on the contrary, extends to at least twice this depth, and is found in considerable wealth of forms even below 950 yards.'

Ocean Highways.—When Columbus set sail in search of a new continent the great sea was indeed a trackless waste. When he, and the bold adventurers who followed in his footsteps, returned to relate their experiences they

laid the foundation for the science of navigation, and, before many years had passed, vessels were sailing in all directions. The discovery of steam, and the invention of the engine, gave the one impetus necessary, and from that day the history of navigation has been an unbroken record of progress. To-day, therefore, the entire sea has been charted and mapped out so thoroughly that it is no longer difficult to find the shortest route from port to port, while the construction of such artificial waterways as the Suez Canal has had a material effect in reducing both the time and the cost of trans-oceanic transportation.

OCEANUS, *ō-sē'â-nŭs:* powerful sea-deity in classical mythology; son of Cœlus (heaven) and Terra (earth). By his marriage with Tethys, he became father of 3,000 sea-nymphs (Oceanides), and as many river-gods. Homer declares him to be the father of all the gods. He is generally represented as an old man with long beard, sitting upon the waves, while ships sail in the distance. He holds a pike in his hand, or a sea-monster stands near. The ancients worshipped him with superstitious reverence, as the deity to whom they intrusted themselves on a voyage.

OCELLUS LUCANUS, *ō-sĕl'ŭs lū-kā'nŭs:* a Pythagorean philosopher: b. Lucania, Italy, 5th century B.C. His works are: *On Law; On Kingly Rule and Piety;* and *On the Nature of the Whole* (Περί τῆς τοῦ πανίος ψύσεως) the last of which is the only one of his treatises now extant, excepting some fragments found in Stobæus, written in Doric. *On the Nature of the Whole* is in Ionic, which fact leads some critics to doubt its authenticity. It is divided into four chapters, in which the author maintains that the whole, that is, Nature, the Universe, has no beginning nor end, and that men have always existed. Consult: Mullach, *Fragmenta Philosophorum Græcorum* (1860); Taylor, *Ocellus Lucanus*, translated into English (1831).

OCELOT, *ō'sĕ-lŏt:* a tropical American wildcat (*Felis pardalis*), averaging about three feet in length exclusive of the tail, and about 18 or 20 inches tall. Its body color is a variable and handsome fawn or grayish-brown, marked with lines of blackish ring-spots. The ocelot ranges northward as far as Louisiana, and is found in forests, where it preys largely upon birds.

OCHIL HILLS, *ōch'il:* hilly range in Scotland, occupying parts of the counties of Perth, Clackmannan, Stirling, Kinross, and Fife; from the vicinity of Stirling n.e. to the Firth of Tay; 24 m. in length, about 12 m. in breadth. The highest summit is Bencleugh (2,352 ft.), near the s.w. extremity. The hills, formed chiefly of greenstone and basalt, contain silver, copper, and iron ores. They afford excellent pasturage.

OCHINO, *o-kē'no*, BERNARDINO: 1487–1565; b. Siena, Tuscany: Italian reformer. He received a meagre education in the languages, studying the Greek but little and the Hebrew none; joined the Franciscans, and 1534 the strict order of the Capuchins. He soon became widely known as an eloquent preacher. After hearing him preach a series of Lenten sermons, Charles V. is said to have exclaimed, 'This man could move the stones themselves!' After preaching at Naples, he visited Venice and other large cities. The churches in which he preached were filled to overflowing. He became confessor to Paul III., and a general of the Capuchins 1538. While preaching at Naples 1540, he departed from the Rom. Cath. standards of doctrine to such an extent that he incurred the displeasure of the dignitaries. He removed to Venice, and, though the Capuchins re-elected him general, he was summoned to Rome on a charge of heresy. He commenced the journey, but was persuaded by friends to leave the country. He went to Geneva 1542, and preached to Italian refugees, to Augsburg 1545, where he preached to an Italian church, and two years later to London, in order to escape the demands of the emperor that he be returned to Italy. He preached in London till Mary became queen, when he went to Geneva. His criticisms on the burning of Servetus (q.v.) made him unpopular, and he removed to Zürich. Here he published some theol. works which indicated a tendency to independent thought on certain doctrines; and on a charge of heresy he was expelled. He went to Poland, from which country, in common with all foreigners not Rom. Catholics, he was banished 1564, and lived but a short time after his return to Germany. He was one of the most earnest and fervent preachers of his time—not readily submissive to authority in forming his creed—not intellectually in sympathy with dogmatic forms of Christian truth—hence often misunderstood in that age of sharp and stern antagonism. He published many sermons and several theol. works.

OCHLESIS, n. *ŏk-lē'sĭs* [Gr. *ochlesis*, disturbance, annoyance]: in *pathol.*, the overcrowding of dwelling-houses, producing unhealthiness and susceptibility to disease.

OCHLOCRACY, n. *ŏk-lŏk'ră-sĭ* [Gr. *ochlos*, the populace or mob; *krateia*, might, power]: a government controlled by the populace; a mob government. OCHLOCRATIC, a. *ŏk'lō-krăt'ĭk*, relating to ochlocracy.

OCHNACEÆ, *ŏk-nā′sē-ē :* natural order of exogenous plants, containing not quite 100 known species, natives of tropical and subtropical countries. Some are trees, most of them undershrubs; all remarkable for smoothness in all parts. Bitter and tonic qualities prevail in this order, and some species are medicinally used in their native countries. The seeds of *Gomphia jabotapita* yield an oil, which is used in salads in the W. Indies and S. America.

OCHRA and OCHRO: other spellings of OKRA, which see.

OCHRE, or OCHER, n. *ō′kėr* [L. and Gr. *ōchra*—from Gr. *ōchros*, pale, pale yellow: OF. *ocre*]: kind of fine clay used as a pigment, varying in color from a pale yellow to a deep orange or brown. The name ochres is applied usually to clays colored with the oxides of iron in various proportions, giving to the clay a lighter or deeper color. Strictly speaking, the term belongs only to a combination of peroxide of iron with water. From many mines, much water charged with ferruginous mud is continually pumped up, and from this water the colored mud or ochre settles. Thus large quantities are procured from the tin mines of Cornwall, England, and the lead and copper mines of N. Wales and the Isle of Man. Ochres occur also ready formed, in beds several ft. thick, in the various geological formations, and are occasionally worked, as at Shotover Hill, Oxford, in Holland, and at many other places in Europe and America. Very remarkable beds are worked in Canada. The ochres so obtained are either calcined for use or not, according to the tint wanted. Calcining adds much to the depth of color, by increasing the degree of oxidation of the contained iron. The most remarkable varieties of ochre are the Siena Earth (Terra di Siena), from Italy; the so-called red chalk, with which sheep are marked; Dutch Ochre; Armenian Bole or Lemnian Earth; Italian Rouge; and Bitry Ochre. They vary in color from an Isabelline yellow, through almost every shade of brown, up to a moderately good red. The finest kinds are used by painters; the coarsest by carpenters for marking out their work, by farmers for marking cattle, etc. OCHRACEOUS, a. *ō-krā′shŭs*, of the color of ochre. OCHERY, a. *ō′kėr-ĭ*, or OCHREY, a., or OCHRY, a. *ō′krĭ*, pert. to or resembling ochre. OCHROITE, n. *ŏk′rō-īt*, an impure variety of cerite.

OCHREA, n., properly OCREA, n. *ŏk′rĕ-ă* [L. *ocrĕă*, a covering to protect the legs]: in *bot.*, a tubular membranous stipule through which the stem seems to pass. OCH′REATE, a. *-āt*, bearing OCH′REÆ, plu. *-ē*; sheathed after the manner of a boot.

OCH′RO: see HIBISCUS.

OCHROLEUCOUS, a. *ŏk′rō-lō′kŭs* [Gr. *ōchra*, ochre *leukos*, white]: in *bot.*, a pale ochery color.

OCHTHODROMUS, *ŏk-thŏd′rō-mŭs* [Gr. *ochthos*, bank, rising ground; *dromos*, from root *drom*, running]: genus of Amer. birds, ringed plovers, belonging to the family *Charadriidæ:* they are characterized by their very large bill. The species *O. Wilsonius*, or Wilson's plover, is abundant on the Atlantic and Gulf coasts of the United States s. of Virginia.

OCKHAM, WILLIAM OF: see OCCAM.

OCKLEY, *ŏk′lĭ*, SIMON: 1678–1720; b. Exeter, England: Oriental scholar. He studied at Queen's College, Cambridge, receiving the degrees B.A. 1697, M.A. 1701, and B.D. 1710. After becoming a fellow of Jesus College, and vicar of Swavesey 1705, he was appointed prof. of Arabic in the Univ. of Cambridge 1711. He made an exhaustive examination of the Arabic MSS. in the Bodleian Library, and compiled therefrom *The History of the Saracens*, which was pub. in two vols., was enthusiastically received by his contemporaries, and long remained the standard history of the people and times of which it treats. Later researches have shown that he depended too much on an author whose imagination had been allowed too free rein. O. had a large and probably extravagant family, and during the later years of his life suffered greatly from poverty. The preface to the second vol. of his *History* was dated at Cambridge Castle, in which he was for some time a prisoner for debt. The story of his financial troubles is told in the *Calamities of Authors*, by D'Israeli. Among his other works were: sermons on *The Christian Priesthood* and *The Necessity of Instructing Children in the Scriptures;* a translation, from the Italian, of *The History of the Present Jews throughout the World;* and a translation of *The Apocryphal Book of Esdras*, from an Arabic version. He died in England.

OCMULGEE, *ŏk-mŭl′ghē:* river in Ga., rising in the n. centre of the state by three streams, and, after a course of 200 m. s.s.e., joining the Oconee, to form the Altamaha. It is navigable to Macon, 130 m. above its mouth.

OCONEE, *ō-kō′nē:* river in Ga., rising in the n.e. part of the state, and flowing s. 250 m., to its junction with the Ocmulgee, to form the Altamaha. It is navigable to Milledgeville, 100 m. above its mouth.

O'CONNELL, *o-kŏn'nĕl*, DANIEL: 1775, Aug. 6—1847, May 15; b. near Cahirciveen, co. Kerry, Ireland; eldest son of Morgan O'C. of Darrynane. His family was ancient, but straitened in circumstances, having lost their estates through the severe laws under which the Irish Rom. Catholics had long suffered. O'C. received his first education from a hedge-schoolmaster, and, after further training under a Rom. Cath. priest in co. Cork, was sent 1790 to the English college at St. Omer. His school reputation was very high; but he was driven home prematurely by the outbreak of the Revolution, and 1794 entered as law-student at Lincoln's Inn. In 1798 he was called to the bar; and it was the boast of his later career, as an advocate of the repeal of the union with England, that his first public speech was delivered at a meeting, in Dublin, convened to protest against that projected measure. The Rom. Catholic party having rallied from the prostration into which they had been thrown through the rebellion of 1798 and its consequences, O'C. was drawn into public political life. In all important meetings of his co-religionists, his unquestioned ability soon made him a leader. He was an active member of all the successive associations which, under the various names 'Catholic Board,' 'Catholic Committee,' 'Catholic Association,' etc., were organized to procure the repeal of the civil disabilities of the Rom. Cath. body. Of the Catholic Assoc. he was the originator; and, though his supremacy in its councils was occasionally challenged by some aspiring associates, he continued almost supreme till its dissolution. By means of this association, and the 'Catholic Rent' which it was enabled to raise, he created so formidable an organization throughout Ireland, that it gradually became apparent that the desired measure of relief could not longer be safely withheld; and the crisis was precipitated by the bold expedient adopted by O'C., of procuring himself to be elected member of parliament for Clare 1828, notwithstanding his well-known legal incapacity to serve in parliament, in consequence of his being obliged to refuse the prescribed oaths of abjuration and supremacy, which refusal then was made the ground of the exclusion of Rom. Catholics from the legislature. This decisive step toward the settlement of the question, though it failed to procure for O'C. admission to parliament, led to discussions within the house, and to agitations outside, so formidable, that, in the beginning of 1829, the Duke of Wellington and Sir Robert Peel found it expedient to give way; and, deserting their former party, they introduced and carried through, in the spring of that year, the well-known measure of Rom. Cath. emancipation. O'C. was at once re-elected, and took his seat for Clare, and continued in parliament until his death. He was elected for his native county 1830, for the city of Dublin 1836, for the town of Kilkenny 1836 (having been unseated for Dublin on petition), for Dublin again 1837, and for co. Cork 1841. During all these years, hav-

ing entirely relinquished his practice in his attention to public affairs, he received, by means of an organized annual subsidy, a large yearly income from the voluntary contributions of the people, by whom he was idolized as their 'Liberator;' and who joined with him in all his successive agitations against the act of union, against the Prot. Church establishment, and in favor of reform. In the progress of more than one of these political agitations, his associations were suppressed by the govt.; and the agitation for a repeal of the union, recommenced 1841, and carried on by 'monster meetings' throughout Ireland. at which O'C. himself was the chief speaker, assumed proportions so formidable, that he, with several others, was indicted for a seditious conspiracy, and, after a long and memorable trial, was convicted, and sentenced to a year's imprisonment, with a fine of £2,000. This judgment was reversed by the house of lords, and O'C., on his discharge, resumed his career, but his health had suffered from confinement, and still more from dissensions and opposition in the councils of his party; and as, on the return of the whigs to power 1846, he consented to support their govt., the malcontents of the Repeal Assoc. openly separated from him, and a bitter feud between 'Young' and 'Old' Ireland ensued. In this quarrel, O'C. steadfastly maintained his favorite precept of 'moral force,' and was supported by the great body of the Rom. Cath. bishops and clergy; but his health gave way in the struggle. He was ordered to try a milder climate; and on his journey to Rome, in the spring of 1847, he was suddenly seized with paralysis, and died at Genoa. His eminence as a public speaker, and especially as a master of popular eloquence, is universally admitted. His speeches, unfortunately, were mostly extempore, and exist only in the reports (uncorrected by himself) taken at the time. As a lawyer, he was versed in criminal and constitutional jurisprudence; as a leader, he had profound sagacity and dexterity, with thorough knowledge of the character of his people; he was sincerely devoted to his church and to his race, and believed fully in the justice of the conflict in which he stood forth as champion. He was a fierce radical as concerned human liberty, yet an immovable conservative as concerned ancient tenets. In his advocacy of the Rom. Cath. claims for equal justice, O'C. carried with him the moral sense of the British people: his later agitation for repeal of the union with Britain failed to command general public assent. He published but a single volume, *A Memoir of Ireland, Native and Saxon*, and a few pamphlets; the most important of which, as illustrating his personal history and character, is *A Letter to the Earl of Shrewsbury*.—See *Life and Times of Daniel O'Connell*, by his son, John O'C.; also *Recollections of Daniel O'Connell*, by John O'Neill Daniel; Fagan's *Life of Daniel O'Connell;* and *The Liberator*, by L. F. Cusack (1872).

OCONOMOWOC, *ō-kō-nō-mo-wŏk′:* a city in Waukesha co., Wis.; on the La Crosse division of the Chicago, Milwaukee and St. Paul railroad; 31 m. w. of Milwaukee, on Oconomowoc creek. It is surrounded by many beautiful lakes, and has attractive drives, mineral springs, and several excellent hotels, rendering it a pleasant summer resort. It has farming and dairying industries, municipal waterworks and electric lighting. Pop. 3,200.

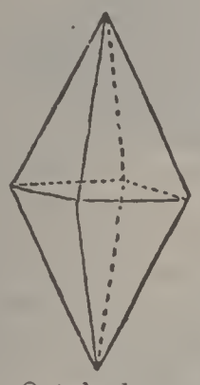
O'CONOR, *o-kŏn′ẽr*, CHARLES, LL.D.: 1804, Jan. 22—1884, May 12; b. New York; son of Thomas O'C. While yet a boy, he commenced studying law, and at the age of 20 was admitted to the bar. By close study and by his great intellectual powers, he quickly gained high rank in his profession. Among the cases which gave him a national fame were the Forrest divorce case, the Slave Jack case 1835, the Lemmon slave case 1856; and the Jumel title suit, in which property to the amount of $6,000,000 was involved. He was the democratic candidate for lieut.gov. of N. Y. 1848, and, though defeated, received many thousand more votes than any other man on the ticket. During the civil war, he was a strong sympathizer with the south; he was the leading counsel for Jefferson Davis when the latter was under indictment for treason, and was one of the bondsmen when bail was granted. He was one of the leaders in the great suits which resulted in the dispersion of the Tweed 'ring' in New York, and refused compensation for his services in these cases, which extended over several years. Against his wish, he was nominated 1872 for pres. by democrats who were opposed to Horace Greeley; and 1876 he was counsel for Samuel J. Tilden in the electoral contest for the presidency. He removed 1881 to Nantucket, which he made his home until his death.

OCONTO, *ō-kŏn′tō:* city, cap. Oconto co., Wis.; at mouth of the Oconto river, on the w. shore of Green Bay; on the Chicago and Northwestern, the Milwaukee Lake Shore and Western, and the Milwaukee and Northern railroads: 30 m. n.e. of Green Bay City. It has lumber and flour mills; farming and dairying industries; churches, schools, free library and a public park. Wagons are manufactured and there are large planing-mills and foundries. The surrounding country is heavily timbered. Pop. (1900) 5,646; (1910) 5,629.

OCTA, *ŏk′ta*, or OCTO, *ŏk′tō* [L. *octo;* Gr. *oktō*, eight]: a common prefix, signifying 'eight.'

OCTAGON, n. *ŏk′tă-gŏn* [Gr. *oktō*, eight; *gōnĭă*, a corner or angle]: plane closed figure of eight sides and eight angles. When the sides are equal, and also the angles, the figure is a 'regular octagon;' in this case, each angle is 135°, or equal to three half right angles. If the alternate corners of a regular O. be joined, a square is constructed; and as the angle contained between the sides of the square and of the O. is one-fourth of a right angle, the O. may easily be constructed from the square as a basis. OCTAGONAL, a. *ŏk-tăg′ŏ-năl*, having eight sides and eight angles.

OCTAHEDRON, n. *ŏk′tă-hē′drŏn* [Gr. *oktō*, eight; *hĕdra*, a seat or place of anything]: one of Plato's five regular solids, being a solid figure bounded by eight triangles, and having twelve edges and six angles. A *regular* O. has its eight triangular faces equilateral, and may, for convenience, be defined as a figure composed of two equal and similar square pyramids, with equilateral triangles for their sides, placed base to base. This solid is symmetrical round any angle. The O. appears in nature as one of the forms of crystals of sulphur. OC′TAHE′DRAL, a. *-drăl*, having eight equal sides. OC′TAHE′DRITE, n. *-tă-hē′drīt*, in *mineral.*, a term for the pure oxide of titanium occurring in elongated eight-sided crystals.



Octahedron.

OCTANDRIA, n. *ŏk-tăn′drĭ-ă* [Gr. *oktō*, eight; *aner* or *andra*, a male]: a class of plants having hermaphrodite flowers with eight stamens. OCTAN′DER, n. *-dėr*, a plant having eight stamens. OCTAN′DRIAN, a. *-drĭ-ăn*, or OCTAN′DROUS, a. *-drŭs*, having the character of the class octandria; having eight distinct stamens.

OCTANGULAR, a. *ŏk-tăng′gū-lėr* [L. *octo*, eight; *an′gulus*, a corner or angle]: having eight angles.

OCTANT, n. *ŏk′tănt* [F. *octant*—from L. *octo*, eight]: a nautical instrument, the measuring arc of which is the eighth part of a circle; the eighth part of a circle.

OCTASTYLE, n. *ŏk′tă-stīl* [Gr. *oktō*, eight; *stulos*, a column]: in *arch.*, a temple or other building having eight columns in front.

OCTATEUCH, *ŏk′ta-tūk*, or OCTOTEUCH, *ŏk′tō-tūk* [Gr. *oktō*, eight; *teuchos*, book]: the first 8 books of the Hebrew scriptures—Genesis to Ruth inclusive.

OCTAVE, n. *ŏk′tāv* [F. *octave*—from L. *octāvus*, eighth—from *octo*, eight]: in *music*, the longest interval in the diatonic scale, as from *do* to *do*, or from C to C; the interval between any musical note and its most perfect concord, which is double its pitch, and occupies the position of the eighth note from it on the diatonic scale. The name octave is often given to the eighth note itself, as well as to the interval. There is between a note and its octave a far closer relation than between any other two notes; they go together almost as one musical sound. In combination, they are hardly distinguishable

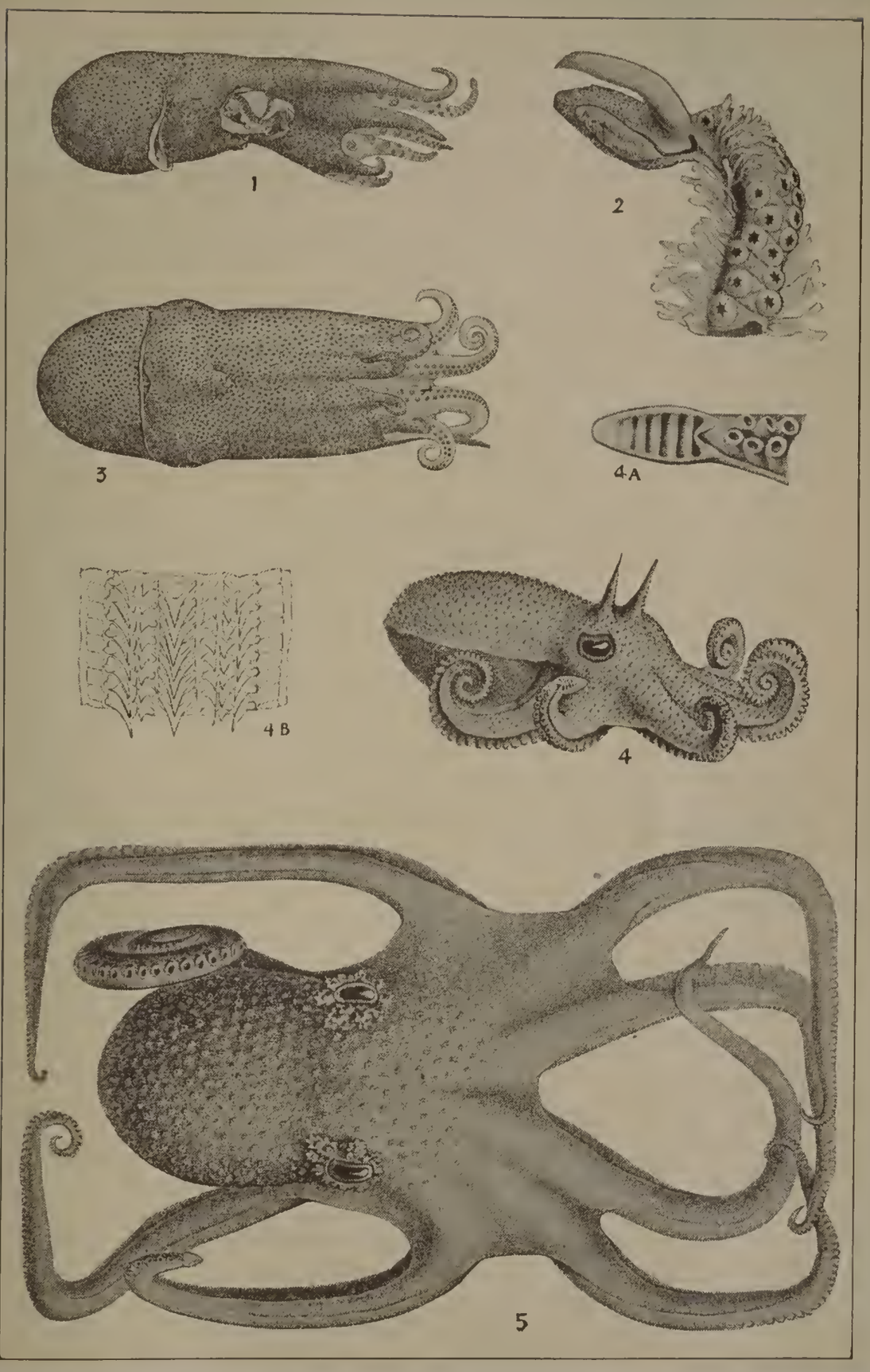
from one another, and their harmonics agree invariably —a coincidence which occurs in the case of no other interval. O., on the *pianoforte*, a harmonic interval of five tones and two semitones. O. is also a name for a small cask for wine, being the eighth part of a pipe. In the calendar, O. signifies eight days, or the eighth day, after a church festival, the festival being included: ADJ. consisting of eight. OCTAVO, a. n. *ŏk-tā′vō* [Sp. *octāvo;* It. *ottavo*, the eighth part—from L. *octāvus*]: having eight leaves to the sheet—applied to the size of a book; applied to one leaf of a sheet of printing-paper folded so as to make eight leaves—usually written 8vo: see BOOK: PAPER.

OCTAVIA, *ŏk-tā′vĭ-a:* daughter of Caius Octavius, Roman pretor B.C. 61; sister of Emperor Augustus, and wife of Mark Antony; d. B.C. 11. She was distinguished for beauty, noble disposition, and all womanly virtues. Her first husband was C. Marcellius, to whom she was married B.C. 50. He died B.C. 41; and, shortly afterward, she consented to marry Antony, to make secure the reconciliation between him and her brother. The event was hailed with joy by all classes. In a few years, Antony became tired of his gentle and noble spouse, and forsook her, returning to his old love for Cleopatra. When the Parthian war broke out, O. wanted to accompany her husband, and actually went as far as Corcyra, whence Antony sent her home, that she might not interrupt his guilty relation with the Egyptian queen. B.C. 35, O. made an effort to rescue him from a degradation which was even endangering the success of the Roman arms, and sailed from Italy with reënforcements of troops and supplies of money; but a message reached her at Athens, ordering her to return to Rome. She proudly obeyed; but, with a magnanimity that recalls the Roman character in earlier and better days, she forwarded the supports to her husband. Her brother Octavian, indignant at the insult to her, would have had her quit her husband's house, and come and live with him; but she refused. B.C. 32, war, long inevitable, broke out between Antony and Octavian; and Antony crowned his insults by sending O. a bill of divorcement. But no injury could overcome the magnanimity of this strong and gentle soul; and, after her husband's death, she brought up with maternal care not only her own children, but also Antony's children by Cleopatra. She died at Rome, and was buried with the highest honors by the state.—Another OCTAVIA, daughter of Emperor Claudius, was wife of Emperor Nero.

OCTENNIAL, a. *ŏk-tĕn′nĭ-ăl* [L. *octo*, eight; *annus*, a year]: happening every eighth year; lasting eight years. OCTEN′NIALLY, ad. *-lĭ*.

OCTILE, n. *ŏk′tĭl* [L. *octo*, eight]: an *octant*.

AMERICAN OCTOPODS.



1. Alloposus Mollis, male. Side view showing the sac containing the hectocotylized arm, cut open so as to expose the partly developed arm.
2. Hectocotylized arm, enlarged.
3. Same animal, ventral view.
4. The common Octopus (*O. bairdi*) of the north Atlantic coast (male).
4*a*. Terminal part of Sexual arm.
4*b*. Section of lingual ribbon, showing flinty teeth.
5. Eight-armed Octopus.

OCTILLION, n. *ŏk-tĭl′yŭn* [L. *octo*, eight, and Eng. *million*]: a number produced by raising a million to the eighth power; in Eng. system of notation, 1 followed by 48 ciphers; in the F. and It. systems, a million multiplied by the eighth power of a thousand—1 followed by 27 ciphers.

OCTOBER, n. *ŏk-tō′bĕr* [L. *October*, October—from *octo*, eight]: eighth month of the so-called 'year of Romulus;' but became the tenth month, as it is with us, when (according to tradition) Numa changed the commencement of the year to Jan. 1. It has 31 days. O. preserved its ancient name notwithstanding the attempts made by the Roman senate, and the Emperors Commodus and Domitian, who substituted for a time the terms Faustinus, Invictus, Domitianus. Many Roman and Greek festivals occurred in this month, the most remarkable of which was the sacrifice at Rome of a horse (which was called *October*) to the god Mars. The other festivals were chiefly bacchanalian. Among the Saxons, O. was styled *Wyn moneth*, or the wine month.

OCTODECIMAL, a. *ŏk′tō-dĕs′ĭ-măl* [L. *octo*, eight; *decem*, ten]: a term designating a crystal whose middle part has eight faces and two summits, together ten.

OCTODECIMO, a. or n. *ŏk′tō-dĕs′ĭ-mō* [L. *octo*, eight; *decem*, ten]: consisting of 18 leaves to a sheet; one leaf of a sheet of printing-paper folded 18 times; applied to the size of a book—usually written 18mo: see under PAPER.

OCTODENTATE, a. *ŏk′tō-dĕn′tāt* [L. *octo*, eight; *dentātus*, toothed]: having eight teeth.

OCTOFID, a. *ŏk′tō-fĭd* [L. *octo*, eight; *findo*, I cleave; *fidī*, I cleft]: cleft or separated into eight segments, as a calyx.

OCTOGENARIAN, n. *ŏk′tō-jĕ-nā′rĭ-ăn* [F. *octogénaire*—from L. *octogenārĭŭs*, of eighty—from *octogēnī*, eighty each—from *octo*, eight: Sp. *octogenario*]: one who is eighty years old: ADJ. also OCTOGENARY, a. *ŏk-tŏj′ĕn-ĕr-ĭ*, of eighty years of age. OCTOG′ENARY, n. an instrument of eight strings.

OCTOGYNOUS, a. *ŏk-tŏj′ĭ-nŭs* [Gr. *oktō*, eight; *gunē*, a woman]: having eight pistils or styles.

OCTOPOD, n. *ŏk′tŏ-pŏd* [Gr. *oktō*, eight; *pous* or *poda*, a foot]: a crustacean or mollusk having eight feet or legs. OCTOPODA, n. plu. *ŏk-tŏp′ō-dă*, or OCTOPODS, n. plu. *ŏk′tŏ-pŏdz*, cuttle-fishes with eight arms attached to the head; a section of dibranchiate cephalopods (see CEPHALOPODA), having the body, in general, very short, the head very distinct; eight arms, not very unequal, furnished with simple suckers; with or without shelly covering. To this section belong Argonauts, Poulpes, etc. OCTOPUS, n. *ŏk′tŏ-pŭs*, an octopod, devil-fish, or poulpe (see POULPE). OCTOPI, n. plu. *ŏk′tŏ-pī*, or OC′TOPUSES, n. plu. *-pŭs-ĕs*.

OCTOROON, n. *ŏk′tŏ-rôn* [L. *octo*, eight]: the offspring of a quadroon and a white person.

OCTOSTYLE, *ŏk′tŏ-stīl:* in classic architecture, a portico composed of eight columns in front.

OCTOSYLLABLE, n. *ŏk′tō-sĭl′lă-bl* [L. *octo*, eight; *syllăbă*, a syllable]: a word consisting of eight syllables. Oc′TOSYLLAB′IC, a. *-lăb′ĭk*, consisting of eight syllables.

OCTROI, n. *ŏk′trwâ* [F. *octroi*, a grant, a city toll—from *octroyer*, to grant—from mid. L. *auctorĭcārĕ*—from L. *auctorārĕ*, to procure, then to grant; L. *auctoritas*, authority]: tax levied at the gates of a city on articles brought into it. O. meant originally any ordinance authorized by the sovereign, and thence came to be restrictively applied to a toll or tax in kind levied from a very early period, in France and other countries of n. Europe on articles of food which passed the barrier or entrance of a town. The right to levy this toll was often delegated to subjects; and to increase its amount, a device was resorted to of raising the weight of the pound in which the O. was taken. The large pound, an ounce heavier than that in ordinary use, was called the *livre d'octroi*, whence the expression *pound troy*. The O. came eventually to be levied in money, and was abolished in France at the Revolution. In 1798 it was re-established, under pretext that it was required for purposes of charity, and called the *octroi de bienfaisance;* and it was reorganized 1816, 42, and 52. Of the O. duty at present levied at the gates of French towns, one-tenth goes to the national treasury, the rest to local expenses. The O. officers are entitled to search all carriages and individuals entering the gates of a town. From the octrois of Paris, government derived, a few years ago, a revenue of 56 million francs, about $10,800,000. In 1860 the Belgian govt. acquired popularity by abolishing the octroi.

The epithet *octroyé* is applied by continental politicians to a constitution granted by a prince, in distinction from one which is the result of a paction between the sovereign and the representatives of the people. Any public company possessing an authorized monopoly like that held by the E. India Company is said to be *octroyé*.

OCTUPLE, a. *ŏk′tū-pl* [L. *oc′tuplus*, eightfold—from *octo*, eight; *plico*, I fold]: eightfold. Oc′TUPLET, n. *ŏk′tū-plĕt*, in *mus.*, group of eight notes which are to be played in the time of six.

OCULAR, a. *ŏk′ū-lĕr* [L. *oculārius*—from *oc′ulus*, an eye]: pert. to the eye; depending on or known by the eye; received by actual view. Oc′ULARLY, ad. *-lĭ*. OCULATE, a. *ŏk′ū-lāt*, furnished with eyes; having spots somewhat like eyes. OCULIST, n. *ŏk′ū-lĭst*, a surgeon who practices only on diseases of the eye. OCULUS, n. *ŏk′ū-lŭs*, in *bot.*, an eye; a leaf-bud. OCULAR DEMONSTRATION, a proof self-evident to the eyesight.

OCULIFORM, a. *ŏ-kū′lĭ-fawrm* [L. *oc′ulus*, an eye; *forma*, shape]: eye-shaped.

OCULINA, n. *ŏk′ū-lī′nă* [L. *oc′ulus*, an eye]: a class of strong branching corals, thus called from the eyelike or starlike polyp-cells which stud their branches.

OCULO-, pref. *ŏk-ū-lō-*: of or belonging to or moving the eye.

OCYDROME, n. *ŏs′ĭ-drōm* [Gr. *okus*, swift, and root *drom*, running]: bird of genus *Ocydromus*, fam. *Rallidæ*; the species are confined to New Zealand; in all, the wings are too short for flight; and the birds are swift-footed, as the name indicates.

OCYPODA, n. *ō-sĭp′ō-dâ* [Gr. *okus*, swift, and root *pod*, foot]: typical genus of fam. *Ocypodidæ*: sand-crab. OCYPODIDÆ, *ō-sĭ-pŏd′ĭ-dē*, fam. of crustaceans comprising the sand-crabs or racing-crabs.

OD, n. *ŏd* [said by some to be from Gr. *hodos*, a way, a passage; by others said to be from the same root as *Odin*, and supposed to mean all-pervading]: name arbitrarily given by Baron von Reichenbach (q.v.) to a peculiar physical force which he thought that he had discovered. This force, according to him, pervades all nature, and manifests itself as a flickering flame or luminous appearance at the poles of magnets, at the poles of crystals, and wherever chemical action is going on. This would account for the luminous figures said to be sometimes seen over recent graves. It is thought that this force produces the phenomena of mesmerism or animal magnetism. The od-force has positive and negative poles, like magnetism. The human body is od-positive on the one side, and od-negative on the other. Certain persons, called 'sensitives,' can see the odic radiation like a luminous vapor in the dark, and can feel it by the touch like a breath. In the fact, as assumed, that the meeting of like odic poles causes a disagreeable sensation, while the pairing of unlike poles causes a pleasant sensation, it is claimed that a sufficient cause is found for those likings and antipathies hitherto held unaccountable. Some sensitive persons cannot sleep on their left side (in the n. hemisphere), because the n. pole of the earth, which is od-negative, affects unpleasantly the od-negative left side. All motion generates od; why, then, may not a stream running underground affect a sensitive water-finder, so that the divining-rod in his or her hand shall move without, it may be, any conscious will? All the phenomena of mesmerism are ascribed to the workings of this od-force. Reichenbach does not pretend to have had the evidence of his own senses for any of the manifestations of his assumed od-force; the whole theory rests on revelations made to him by 'sensitives.' The theory has no basis in science. For details, see Reichenbach's large work, transl. by Dr. Ashburner, *The Dynamics of Magnetism*; or his *Odisch-Magnetische Briefe*; also *Transactions* of the Psychical Research Society (1883). ODIC, *ō′dĭk* or *ŏd′ĭk*, pertaining to the od-force. ***Odyl, Odyle, Odylic force,*** are other names for Od.

OD, or 'OD, or ODD: euphemism for the name *God*; formerly used as an interjectional oath.

ODAL, *ō'dal:* same as UDAL (q.v.).

ODAL, *ŏd'al* [Ind. *adul*]: climbing shrub, native of India: *Sarcostigma kleinii.* An oil expressed from the seeds is used in the treatment of rheumatism, and is also burned in lamps.

ODALISQUE, n. *ō'dă-lĭsk* [F. *odalisque*—from Turk. *odalik*, a chamber companion—from *odah*, a chamber]: in *Turkey*, one of the female slaves in the sultan's harem.

ODAL, *ō'dal* (or UDAL, *ū'dal*), RIGHT [Celtic *od*, property]: a tenure of land which was absolute, and not dependent on a superior, which prevailed throughout n. Europe before the rise of feudalism. It was founded on the tie of blood which connected freeman with freeman, and not on the tie of service. It was the policy of the sovereign authority everywhere to make it advantageous for the freemen to exchange the odal tie for the tie of service—a change which paved the way for the feudal system. The odallers of Orkney were allowed to retain or resume their ancient privileges on paying a large contribution to the erection of St. Magnus's Cathedral at Kirkwall; and the odal tenure prevails to this day in the Orkney and Shetland Islands, the right to land being completed without writing, by undisturbed possession proved by witnesses before an inquest.

ODD, a. *ŏd* [Norw. *odde*, odd—from *oddr*, a point: Dan. *odde;* Sw. *udde*, a point—*lit.*, a point or object sticking up for want of another to match it: Icel. *oldi*, a triangle, a point of land]: not even; left over after some definite or even number; not taken into the common account; uncommon; strange; eccentric; droll; unmatched; in *OE.*, outlying; unheeded; unlucky. ODD'LY, ad. *-lĭ*, in an odd manner; strangely; unaccountably. ODD'NESS, n. *-nĕs*, state of being not even; singularity; uncouthness. ODDITY, n. *ŏd'ĭ-tĭ*, a singular person or thing; singularity; queerness. ODD-LOOKING, a. having a singular look. ODD NUMBER, any number which leaves a remainder on being divided by two. ODDS, n. plu. *ŏdz*, difference in favor of one against another; more than an even wager; more likely than the contrary; advantage; superiority; in *OE.*, dispute; variance; quarrel. AT ODDS, at variance. ODDS AND ENDS [properly *orts* and ends (see ORT)]: scraps; fragments; remnants. *Note.*—Skeat says ODDS AND ENDS means 'points and ends.' As stated in the text, however, *odds* is an easy corruption of *orts.*—SYN. of 'odd': uneven; quaint; comical; queer; singular; unusual; whimsical; extraordinary; fantastical; particular; uncouth; unaccountable; unlikely.

ODD FELLOWS.

ODD FELLOWS, *ŏd' fĕl'lōz*, INDEPENDENT ORDER OF; one of the most extensive self-governed beneficial associations in the world; organized in Manchester, England, 1812, though isolated 'lodges' had existed in various places for some time previously—the oldest whose name has been preserved being the 'Loyal Aristarcus, No. 9,' which met 1745 in London; though in De Foe is an earlier mention of the 'Society of Odd Fellows.' These lodges were generally secret fraternities, humble imitations of Freemasonry—adopting a similar system of initiatory rites, phraseology, and organization—instituted for social and convivial purposes, and only occasionally extending charitable assistance to members. On its organization in Manchester as 'The Manchester Unity,' the main purpose of Odd-fellowship was declared by its laws to be 'to render assistance to every brother who may apply through sickness, distress, or otherwise, if he be well attached to the queen and government, and faithful to the order;' and in Great Britain this continues the basis of all its operations. It retains some of the characteristics of Freemasonry, in possessing passwords and peculiar 'grips,' whereby members can recognize one another. The headquarters for Britain are at Manchester, where the grand master and board of directors meet quarterly to hear appeals and transact the general business of the order. This body of Odd Fellows, generally spoken of as 'The Manchester Unity,' has established lodges in England, Scotland, Wales, Ireland, France, Turkey, Africa, N. and S. America, E. and W. Indies, and Australana, and has a total enrollment of over 950,000 members. It is virtually a chartered benefit society, its annual reports being made to the govt. The Grand United O. of O. also of English origin and the parent of the U. S. colored lodges, ranks next in importance. The early lodges of Odd Fellows organized in the United States (about 1806) soon became extinct, and no permanent branch of the English order was established till 1819, Apr. 26, when Thomas Wildey and four companions, former members of English lodges, organized Washington Lodge, No. 1, in Baltimore. In the following year, by authority of the Manchester Unity, this body was invested with grand and subordinate lodge prerogatives, and took the title 'No. 1, Washington Lodge, the Grand Lodge of Maryland and of the U. S. of America.' An independent charter was obtained from the English body 1826, and a complete separation of the American and English Odd Fellows was consummated 1843. Since then what is known as American Odd-fellowship has been established in Australasia, Chili, Cuba, Denmark, France, Germany, Japan, Mexico, the Netherlands, Norway, Peru, Sandwich Islands, Sweden, and Switzerland; and the supreme American body now bears the title of 'The Sovereign Grand Lodge, I. O. O. F.' Under its jurisdiction there are now 2 quasi-independent grand lodges (Germany and Australasia), 67 grand lodges, 13,277 subordinate lodges, 55 grand encampments, 2,862 subordinate encampments, with a

total enrollment of 1,329,956 members, including also 6,027 Rebekah Degree lodges (for 3d degree members and their wives, daughters over 18 years of age and widows). Although no features of health or life insurance were incorporated in the polity of the American Order, it has always insisted upon stated weekly and funeral benefits, distinct from voluntary charity, these payments to members who are ill, or in affliction, being of *right* not a donation. The invested funds of the order amount to over $34,386,495; the relief granted since 1830 to over $96,468,525; and the average annual relief to over $4,068,510.

ODE, n. *ōd* [Gr. *ōdē*, a song or ode—from *aeidein*, to sing: It. *oda:* F. *ode*]: short poem of unequal measures, confined to the expression of sentiment or imaginative thought, admitting narrative only incidentally, and longer and more varied than the song or ballad; a lyric poem. Ode meant originally any lyrical piece adapted to be sung. In modern use of the word odes are distinguished from songs by not being necessarily in a form to be sung, and by embodying loftier conceptions and more intense and passionate emotions. The language of the ode is therefore abrupt, concise, and energetic; and the highest art of the poet is called into requisition in adapting the meters and cadences to the varying thoughts and emotions —hence the changes of meter and versification in many odes. The rapt state of inspiration that gives birth to the ode leads the poet to conceive all nature as animated and conscious, and, instead of speaking *about* persons and objects, to address them as present. See Gosse's *English Odes* (1881).

Among the highest examples of the ode are the *Song of Moses* and several of the Psalms. Dryden's *Alexander's Feast* is reckoned one of the best odes in the English language. Additional specimens are: Gray's *Bard*, Collins's *Ode to the Passions*, Burns's *Scots wha ha'e*, Coleridge's *Ode to the Departing Year* and *Dejection*, Shelley's *Ode to the Skylark*, and Wordsworth's *Ode on the Recollections of Immortality in Childhood.*

ODENKIRCHEN, *ō'dĕn-kĭrch-ĕn:* town of Rhenish Prussia, 15 m. w.s.w. from Düsseldorf, near the right bank of the Niers. It has manufactures of velvets, paper, leather, etc., and, like many other manufacturing towns in the same district, has recently increased in size and population. Pop. 15,000.

ODENSE, *ō'dĕn-sĕh*, anc. Odin's-Ey, or Odin's Oe (i.e., Odin's Island): chief town of the Danish Island of Fünen, and oldest city in the kingdom; in the amt or dist. of O.; 55° 25′ n. lat., and 10° 20′ e. long. O. is the seat of the gov. of the island and the see of a bishop; has a gymnasium and several literary societies, and is an active, thriving provincial town. A bishopric was founded here 988, prior to which time O. bore the reputation of being the first city established by Odin and his followers. The cathedral, founded 1086 by St. Knud, whose remains, with those of several early Danish kings, were deposited here, is a fine specimen of the early simple Gothic style. The lay convent or college for ladies contains an extensive library, furnished with copies of all printed Danish works. At O. a diet was held 1527, in which the Reformed or Lutheran doctrines were declared the established creed of Denmark, and equality of rights was granted to Protestants. A diet there 1539 promulgated the laws regulating the affairs of the Reformed Church. Pop. (1890) 30,277; (1901) 40,138.

O'DENWALD: see HESSE-DARMSTADT.

ODEON, n. *ō-dē'ŏn*, or ODE'UM, n. *-ŭm* [L. *odēŭm;* Gr. *ōdeion*, a music-room—from Gr. *ōdē*, a song]: in anc. Greece, a musical theatre, smaller than the theatre and roofed, in which anc. poets and musicians contended for prizes. Sparta had the first, B.C. 7th c.: later every large Greek city had one (Athens had three—one seating 8,000 people). Domitius introduced the O. into Rome.

ODER, *ō'dĕr* (Lat. *Viadrus*, Slavon. *Vjodr*): one of the principal rivers of Germany, rising in the Leselberg on the table-land of Moravia, more than one thousand ft. above sea-level and entering Prussian Silesia at Odersberg, after a course of about 60 m. After traversing Brandenburg in a n.w. direction, it crosses Pomerania, and empties into the Stettiner Haff, whence it passes into the Baltic by the triple arms of the Dievenow, Peene, and Swine, which inclose the islands of Wollin and Usedom. The O. has a course of more than 500 m., and a river-basin of 50,000 sq.m. The rapid flow of this river, induced by its very considerable fall, is accelerated by the affluence of several important mountain streams, and thus contributes, together with the silting at the embouchures of these streams, to render the navigation difficult; great expense and labor being, moreover, necessary to keep the embankments in order, and to prevent the overflowing of the river. The O. has numerous secondary streams, the most important of which are the Oppa, Neisse, Ohlau, Klodnitz, Bartsch, Warte, and the Ihna; and is connected with the Havel and thence with the Elbe by the Finow canal, and with the Spree by the Friedrich-Wilhelms canal. The chief trading port of the O. is Swinemunde, an important centre for transfer of colonial and other foreign goods to n. Germany and Poland. At Ratibor, 17 m. below Oderberg, the river becomes navigable and is more than 100 ft. in breadth; at Oppeln, in Prussian Silesia, it has a breadth of 238 ft. As a boundary river, it is of military importance and is well defended by the fortresses of Kosel, Grossglogau, Küstrin, and Stettin.

ODESSA, *ō-dĕs'sa:* important seaport and commercial city of s. Russia, govt. of Kherson, on an acclivity sloping to the shore, on the n.w. coast of the Black Sea, 32 m. n.e. of the mouth of the Dniester; lat. 46° 29′ n., long. 30° 44′ e. The harbor is formed by two large moles defended by strong works, and is capable of containing 200 vessels. The bay is deep enough even close in shore to admit the largest men-of-war: it is frozen for a few days in severe winters. The promenade along the face of the cliff, descending to the shore by a broad stone stair of 204 steps, is the favorite walk of the inhabitants. Here also stands the monument of the Duc de Richelieu, to whom in great part the town is indebted for its prosperity. In the pedestal of the monument is preserved the ball by which he was shot during the bombardment of the town by the allied fleet 1854. The University of O., founded 1865, had (1877) 43 professors and 252 students; and the library more than 150,000 vols. The city contains many fine edifices, e.g., the Cathedral of St. Nicholas, the Admiralty, the Custom-house, etc. Owing to the intensity of the heat in summer (rising occasionally to 120°), and the dryness of the soil, vegetation in the vicinity is very poor. In the neighborhood are quarries of the soft stone used for building purposes in O., and in the surrounding towns. One of the great deficiencies of O. formerly was the lack of good water; but works for securing ample supply from the Dniester were completed 1873. Gas was used in O. first in 1861. A railway, opened 1872, has added greatly to the commercial success and importance of O., as it connects it, and of course Kherson, with the governments n. and e. of it in Russia. Tramways have been laid, and new quays and custom-houses erected on ground reclaimed from the sea. The estimated value of the various quantities of grain, wool, hides, tallow, and other articles of export aggregate annually about $55,000,000; imports, $19,127,000; over 5,375 vessels of 2,983,150 tons (2,235 sailing vessels of 138,150 tons) visit the port annually. O. is also an important manufacturing town with over 260 factories employing 12,000 workpeople, with an annual output valued at $13,000,000, comprising flour, sugar, tobacco, candles, ropes, cast-iron goods, soap and other products. Pop. 405,000.

In ancient times, O. (Gr. *Odessus*) was inhabited by a Greek colony, and later by Tartar tribes. In the beginning of the 15th c., the Turks constructed a fortress here, which was taken by the Russians 1789. In 1793, a Russian fortress was built here, and became the nucleus of a town and port, which two years later received the name Odessa. The Duc de Richelieu, a French emigrant in the Russian service, was appointed gov. here 1803, and during the 11 years of his wise administration, the town prospered rapidly. Since 1823, the city has formed part of the general governorship of s. Russia; is the seat of its administration, and the residence of the gov.-gen. and of an abp. The advantageous commercial position of the city, and the privileges granted by government, but chiefly the privileges of a free port

1817–58 (in place of which it now receives an annual subsidy), have developed this city from a mere Turkish fortress into the chief commercial town of the Russian empire after St. Petersburg and Riga. On the outbreak of the Crimean war, 1854, a British steamer went to O. to bring away the British consul, and was fired upon by the batteries of the city. Twelve English war-steamers attacked O., and in a few hours destroyed the fortifications and took a number of Russian vessels.

ODEYPOOR, *ō-dā-pôr'*, or OODYPORE, *ô-dĭ-pōr'*, or UDAIPUR, *ô-dī-pôr':* territory in India; a Rajpoot state, called also Meywar; area, 12,600 sq. m. The cap., Oodeypur, stands on one of the most picturesque sites in India, and has a noble palace; pop. about 35,000. Pop. of state (1901) 1,030,212.—Several terri. in India have the same name: among these is a tributary state in Chota Nagpore, 1,000 sq. m.; pop. 30,000. Chota O. is a tributary state in Gujerat; 650 sq. m.; pop. 70,000.

ODGER, *ŏj'ẽr*, GEORGE: labor reformer: 1820–77; b. near Plymouth, England. At a very early age he was taken from school to learn the trade of shoemaker, but continued his studies without a teacher, and attracted considerable attention as a public reader and a politician. Removing to London he joined the Soc. of Cordwainers, and 1859 came into notice as a labor reformer. He was sec. of the London Trades Council 1863, was one of the leaders of the Reform League, and was twice an unsuccessful candidate for a seat in the house of commons. Several members of parliament attended his funeral and provision was made for his widow by a public subscription.

OD'IC FORCE: see OD.

ODIN, *ō'dĭn:* Scandinavian deity; called *Woden* among the ANGLO-SAXONS, whence the fourth day of the week is called *Wednesday*. O. is the chief god of Northern Mythology. According to the sagas, O. and his brothers, Vile and Ve, sons of *Boer*, or the first-born, slew Ymer or Chaos, and from his body created the world, converting his flesh into dry land; his blood, which at first occasioned a flood, into the sea; his bones into mountains; his skull into the vault of heaven; and his brows into the spot known as *Midgaard*, the middle part of the earth, intended for the habitation of the sons of men. O., as the highest of the gods, the *Alfader*, rules heaven and earth, and is omniscient. As ruler of heaven, his seat is Valaskjalf, from whence his two black ravens, Huginn (Thought) and Muninn (Memory), fly daily forth to gather tidings of all that is being done throughout the world. As god of war, he holds his court in Valhalla, whither come all brave warriors after death to revel in the tumultuous joys in which they took most pleasure while on earth. His greatest treasures are his eight-footed steed Sleipner, his spear Gungner, and his ring Draupner. As the concentration and source of all greatness, excellence, and activity, O. bears numerous different names. By drinking from Mimir's fountain, he became the wisest of gods and men, but he purchased the distinction at the cost

of one eye. He is the greatest of sorcerers, and imparts a knowledge of his wondrous arts to his favorites. Frigga is his queen, mother of Baldur, the Scandinavian Apollo; but he has other wives and favorites, and a numerous progeny of sons and daughters. Although the worship of O. extended over all the Scandinavian lands, it found its most zealous followers in Denmark, where, in the vulgar superstition, he still rides abroad as the wild huntsman, rushing over land and water in the storm-beaten skies of winter.

The historical interpretation of this myth, as given by Snorre Sturleson, compiler of the *Heimskringla*, or Chronicles of the Kings of Norway prior to the introduction of Christianity, and followed in recent times by the historian Suhm, is, that O. was a chief of the Œsir, a Scythian tribe, who, fleeing before the ruthless aggressions of the Romans, passed through Germany to Scandinavia, where, by their noble appearance, superior prowess, and higher intelligence, they easily vanquished the inferior races of those lands, and persuaded them that they were of godlike origin. According to one tradition, O. conquered the country of the Saxons on his way; and leaving one of his sons to rule there, and introduce a new religion, in which he, as the chief god Wuotan, received divine honors, advanced on his victorious course, and making himself master of Denmark, placed another son, Skjold, to reign over the land, from whom descended the royal dynasty of the Skjoldingar. He next entered Sweden, where the king, Gylfi, accepted his new religion, and with the whole nation worshipped him as a divinity, and received his son Yugni as their supreme lord and high-priest, from whom descended the royal race of the Yuglingars, who long reigned in Sweden. In like manner he founded, through his son Sœming, a new dynasty in Norway; and besides these, many sovereign families of n. Germany, including the Saxon princes of Britain, traced their descent to Odin. As it has been found impossible to refer to one individual all the mythical and historical elements which group themselves around the name of O., Wodin, or Wuotan, it has been suggested by Suhm and other historians, that there may have been two or three ancient northern heroes of the name; but the origin and native country of the assumed O., his date and all that relates to him remains shrouded in complete obscurity. It is probable, however, that the myth of O. originated in nature-worship. See SCANDINAVIAN MYTHOLOGY.

ODIOUS, a. *ō′dĭ-ŭs* [L. *odĭōsŭs*, hateful to one, odious —from *odĭŭm*, hatred, ill-will—from *odi*, I hate: It. *odioso:* F. *odieux*]: hateful; detestable; deserving or causing hate; disgusting; a word expressive of strong disapprobation, or simply of disgust. O′DIOUSLY, ad. *-lĭ*. O′DIOUSNESS, n. *-nĕs*, the quality of being odious. ODIUM, n. *ō′dĭ-ŭm*, hatred. ODIUM THEOLOGICUM, *thē′ŏ-lŏj′ĭ-kŭm* [L. theological hatred]: the hatred peculiar to persons contending in theological disputes, or to persons belonging to different sects.—SYN. of 'odious': abominable; loathsome; repulsive; unpopular; forbidding; invidious;—of 'odium': hatred; dislike; offensiveness; abhorrence; detestation; antipathy.

ODOACER.

ODOACER, *ŏd-o-ā'sėr* or *ō-dō'a-sėr* (also ODOVACER, ODOBAGAR, ODOVACHAR, OTACHAR, etc., and, according to St. Martin, the same as OTTOCHAR, a name frequent in Germany during the middle ages): about 434–493: ruler of Italy 476–493; son of Edecon, a secretary of Attila, and one of his ambassadors to the court of Constantinople. This Edecon was also captain of the Scyrri, who formed the bodyguard of the king of the Huns. After the death of Attila, he remained faithful to the family of his master, but perished about 463 in an unequal struggle with the Ostrogoths. He left two sons, Onulf and Odoacer, the former of whom went to seek his fortune in the East; while O., after leading for some time the life of a bandit chief among the Noric Alps, determined to proceed to Italy, whither barbarian adventurers were flocking from all Europe. According to a monkish legend, a pious hermit, St. Severinus, whom he went to visit before his departure, prophesied his future greatness. O. entered the military service of the Western Roman Empire, and rapidly rose to eminence. He took part in the revolution by which Orestes (475) drove Emperor Julius Nepos from the throne, and conferred on his son Romulus the title of Augustus, which the people scoffingly changed into Augustulus. He soon perceived the weakness of the new ruler, and resolved to profit by it. He had little difficulty in persuading the barbarian soldiery, who had effected the revolution, that Italy belonged to them, and in their name demanded of Orestes the third part of the land, as the reward of their help. This Orestes refused; and O., at the head of his Herulians, Rugians, Turcilingians, and Scyrii, marched against Pavia, which Orestes had garrisoned, stormed the city, and put his opponent to death (476). Romulus abdicated, and withdrew into obscurity. What became of him, is not known. Thus perished the Roman empire. O. was a wise, moderate, and politic ruler, quite unlike our general notion of a barbarian. In order not to offend the Byzantine emperor Zeno, he took the title of king only, and caused the senate to dispatch to Constantinople a flattering letter, in which it declared one emperor to be enough for both East and West; renounced its right of appointing the emperors, expressed its confidence in the civil and military talents of O., and begged Zeno to confer on him the administration of Italy. After some hesitation, the Byzantine emperor yielded to the entreaties of the senate, and O. received the title *Patricius*. He fixed his residence at Ravenna. According to his promise, he divided among his companions the third part of the land of Italy—a measure far less unjust than at first sight may seem, for the peninsula was then almost depopulated, and many domains were lying waste and ownerless. This barbarian ruler did everything in his power to lift Italy out of the deplorable condition into which she had sunk, and to breathe fresh life into her municipal institutions—those venerable relics of nobler days. He even re-established the consulate, which was held by 11 of the most illustrious senators in succession, maintained peace throughout the peninsula, overawed the Gauls and Germans, and recon-

quered Dalmatia and Noricum. In religion, though an Arian himself, he acted with a kingly impartiality that more orthodox monarchs have rarely exhibited. Gibbon remarks, with his usual pointed sarcasm, that the *silence* of the Catholics attests the toleration which they enjoyed. The valor, wisdom, and success of O. appear to have excited the jealousy and alarm of Zeno, who encouraged Theodoric, King of the Ostrogoths, a still greater warrior and sovereign than O. himself, to undertake an expedition against Italy. The first battle was fought on the banks of the Isontius (mod. *Isonzo*) 489, Aug. 28. O. was beaten, and retreated. During his retreat, he hazarded another battle at Verona, and was again beaten. He then hastened to Rome, to rouse the inhabitants, but the gates of the city were closed against him. Returning northward to his capital, Ravenna, he reassembled the wrecks of his army, and in 490 once more marched against the Ostrogoths, whose advance-guard he defeated, and pursued to the walls of Pavia. In another great battle on the banks of the Adda, O. was vanquished the third time. He then shut himself up in Ravenna, where Theodoric besieged him three years. O. capitulated, on condition that the kingdom of Italy should be shared between him and Theodoric. This agreement was solemnly sworn to by both parties, 493, Feb. 27; but on Mar. 5 O. was assassinated at a feast, either by Theodoric himself or by his command.

ODOMETER, n. *ō-dŏm'ĕ-tĕr* [Gr. *hodos*, a way; *metron*, a measure]: instrument attached to a carriage or other vehicle, for registering the distance that it has travelled. Such machines have been in use from an early period, and one is described by Vitruvius in that part of his work *De Architectura* which treats of machines. The instrument, as commonly employed, consists of a train of wheel-work, which communicates motion from the axle of the carriage wheel to an index which moves round the circumference of a dial fixed in one side of the carriage over the axle. The wheel-work is arranged so as to produce a great diminution of the velocity impressed by the axle of the vehicle, and the dial is so graduated that the index can show the number of miles, furlongs, yards, etc., traversed. The instrument is constructed also to work independently, being in this case provided with wheels and an axle of its own; when this is done, the wheel is made of such a size that its circumference is an aliquot part of a mile, an arrangement which greatly simplifies the calculation of the distance traversed. The complete O. can then be drawn along by a man on foot or attached behind a carriage. See PEDOMETER. ODOMETRICAL, a. *o'dō-mĕt'rĭ-kăl*, pertaining to an odometer.

O'DONNELL, *o-dŏn'ĕl*, LEOPOLD, Duke of Tetuan, Marshal of Spain: 1809, Jan. 12—1867, Nov. 5; b. Santa Cruz, Teneriffe; descended from an ancient Irish family that emigrated to Spain after the battle of the Boyne; son of Henry Joseph O'D. (1769–1834, Count of La Bisbal). Young O'D. entered the Spanish army, and bravely espoused the cause of the infant Queen Isabella against her uncle, Don Carlos; when the Carlists were overthrown, he was created

Count of Lucena, made gen. of brigade, and chief of staff to Espartero. He took the side of the queen-mother 1840; emigrated with her to France, at the time when her cause seemed desperate; and took up his residence at Orleans, where he planned many of the political risings and disturbances under the rule of Espartero. He headed in person a revolt of the Navarrese againt the minister, but on its failure returned to France. In 1843, his intrigues against Espartero (q.v.) were successful; and he was rewarded by the gov.-generalship of Cuba, where he amassed a large fortune by favoring the iniquitous trade in slaves. When he returned to Spain (1845) he intrigued against Bravo Murillo and Narvaez; and when the latter was succeeded by Sartorius, O'D., proscribed by the govt., headed a military insurrection. Defeated, and driven into Andalusia 1854, he issued a liberal manifesto. When Espartero gave in his adhesion, the Spaniards rose *en masse*, and replaced the ex-regent at the helm. Espartero made O'D. a marshal and minister of war. O'D. again plotted against his old benefactor, and in 1856 supplanted him by a *coup d'état*. He was in three months' time succeeded by Narvaez, but in 1858 he returned to power; and 1859 he commanded the army in Morocco. The campaign was tedious, but at last O'D., gaining a complete victory, took the Moorish camp, and the city of Tetuan surrendered. The Emperor of Morocco submitted to a loss of territory, and O'D. was made Duke of Tetuan. In 1866 his cabinet was upset by Narvaez. He then retired to Paris, and died at Biarritz. The O'D. ministry improved the finances, army, and administration of Spain.

ODONTALGIA, n. *ō'dŏn-tăl'jĭ-ă*, or O'DONTAL'GY, n. *-tăl'jĭ* [G. *odous*, or *odonta*, a tooth; *algos*, pain]: toothache. O'DONTAL'GIC, a. *-jĭk*, pertaining to the toothache: N. a remedy for the toothache

ODONTO, n. *ō-dŏn'tō* [Gr. *odous*, or *odonta*, a tooth]: a powder for the teeth. ODON'TOID, a. *-toyd* [Gr. *eidos*, appearance]: tooth-like.

ODONTOBLASTS, n. plu. *ō-dŏn'tō-blăsts* [Gr. *odonta*, a tooth; *blastos*, a bud, a sucker]: large cells which secrete the dentine of the teeth.

ODONTOCETI, n. plu. *ō-dŏn'tō-sē'tī* [Gr. *odontes*, teeth; *kētos*, a whale]: the toothed whales, in contradistinction to the baleen or whalebone whales.

ODONTOGRAPH. n. *ō-dŏn'tō-grăf* [Gr. *odous*, or *odonta*, a tooth; *graphō*, I write]: an instr. for finding the arcs of circles, used in the construction of toothed wheels which will work truly on each other. O'DONTOG'RAPHY, n. *-tŏg'-ră-fĭ*, that branch of anatomy which treats of the structure and nature of teeth.

ODONTOLITE, n. *ō-dŏn'tō līt* [Gr. *odous*, or *odonta*, a tooth; *lithos*, a stone]: a petrified tooth; a bone or tooth colored by phosphate of iron; also called *bone turquoise*.

ODONTOLOGY, n. *ō'dŏn-tŏl'ŏ-jĭ* [Gr. *odous*, or *odonta*, a tooth; *logos*, a discourse]: that branch of the science of anatomy which treats of teeth (see TEETH). ODON'TOLOG'-ICAL, a. *-lŏj'ĭ-kăl*, of or belonging to.

ODONTOPHORE, n. *ō-dŏn'tō-fōr* [Gr. *odous*, or *odonta*, a tooth; *phorĕō*, I bear]: the tongue or masticatory apparatus of Gasteropoda and Pteropoda, etc.

ODONTOPTERIS, n. *ō'dŏn-tŏp'tĕr-ĭs* [Gr. *odous*, or *odonta*, a tooth; *ptĕris*, a fern]: a genus of fossil ferns found in the Coal-measures—so called from the sharp tooth-like lobes of their leaflets.

ODONTORNITHIDÆ, n. plu. *ō-dŏn'tŏr-nĭth'ĭ-dē*, or ODONTORNITHES, n. plu. *ō-dŏn'tŏr-nī'thēz* [Gr. *odous* or *odonta*, a tooth; *ornis* or *ornītha*, a bird]: in *zool.*, name proposed by Marsh for the toothed birds of which some have been described for the first time by him. Marsh divides the O. into three orders, making the European *Archæopteryx* (see SOLENHOFEN LITHOGRAPHIC STONE) the first. The remains of the second and third orders have recently been found in considerable quantities in the middle cretaceous formations of Kansas. The *Hesperornis* was a large-boned aquatic animal without power of flight, but probably with strong powers of swimming and diving. From bill to tail its length was six ft.; the neck was long and flexible; the teeth, covered with smooth enamel, terminated upward in conical pointed crowns, and downward in stout fangs. The third order, *Ichthyornis*, is subdivided into two genera, *Ichthyornis* and *Apatornis*, both smaller birds resembling terns. See Marsh's *Odontornithes* (1880).

ODONTOSTOMATOUS, a. *ō-dŏn'tō-stŏm'ă-tŭs* [Gr. *odous*, or *odonta*, a tooth; *stoma*, a mouth—gen. *stomătos*]: a term applied to insects having mandibles.

ODOR, n. *ō'dėr* [F. *odeur*—from L. *odor*, a smell: It. *odore*]: a sweet or an offensive smell; perfume. ODOROUS, a. *ō'dėr-ŭs*, sweet of scent; fragrant. O'DOROUSLY, ad. *-lĭ*. O'DORLESS, a *-lĕs*, destitute of odor. ODORINE, n. *ō'dėr-ĭn*, a substance obtained from the volatile oil of bones. IN BAD ODOR, out of favor; in bad repute.

ODORIFEROUS, a. *ō'dėr-ĭf'ėr-ŭs* [L. *odor*, a smell; *fero*, I bear or carry]: sweet-scented; diffusing fragrance. O'DORIF'EROUSLY, ad. *-lĭ*. O'DORIF'EROUSNESS, n. *-nĕs*, the quality of being odorous, or of diffusing odor.

ODS, *ŏdz* [corruption of *God's*]: in *OE.*, a common prefix in certain half-suppressed oaths. ODSBODIKINS, int. *ŏdz-bŏd'ĭ-kĭnz* [*bodi* for *body; kin*, little]: in *OE.*, the little body of God. ODSPIT'IKINS, int. *-pĭt'ĭ-kĭnz* [*piti* for *pity*]: the pity or mercy of God; may be a form of *odsbodikins*.

ODYLIC, a. *ō-dĭl'ĭk* [Gr. *hodos*, a way; *hulē*, matter, a material]: pertaining to the force or natural power which is supposed by many to produce the phenomena of mesmerism or animal magnetism. ODYLIC FORCE, or ODYLE, n. *ō'dĭl*, the supposed force or power: see OD.

ODYSSEY, n. *ŏd'ĭs-sĭ:* the second of the great epic poems by Homer, narrating the wanderings of *Odysseus* or Ulysses. ODYSSEUS, Greek form of the Latin *Ulysses*, which see.

Œ, sounding *ē*—when words sometimes spelt with *æ* cannot be found, consult the word as if beginning with *e*.

OE, n., or OY, n. *ō'ĕ* [Gael. *ogha*]. a grandchild.

ŒCOLAMPADIUS, *ĕk-o-lăm-pā'dĭ-ŭs*, Ger. *ā-ko-lâm-pâ'-dė-ûs*, JOANNES—Latinized from the German JOHANN HAUSSCHEIN: eminent coadjutor of Zwingli in the Swiss Reformation, 1482–1531, Nov. 23; b. Weinsberg, in Swabia. He relinquished the study of law at Bologna for that of theology at Heidelberg, became tutor to the sons of the elector palatine, and subsequently preacher in Weinsberg. This office he resigned in order to study the Greek language under Reuchlin at Stuttgart. He also learned Hebrew from a Spanish physician, Matthew Adrian. Being appointed preacher at Basel, he formed the acquaintance of Erasmus, who highly appreciated his classical attainments, and employed his assistance in his edition of the New Test. In 1516, Œ. left Basel for Augsburg, where also he filled the office of preacher, and where he entered into a convent. But Luther's publications so greatly influenced him, that he left the convent, and became chaplain to Franz von Sickingen, after whose death he returned to Basel 1522, and in the capacity of preacher and prof. of theology commenced his career as a reformer. He held disputations with supporters of the Church of Rome in Baden 1526, and in Bern 1528. In the controversy concerning the Lord's Supper, he gradually adopted more and more the views of Zwingli, and at last 1525 maintained them in a treatise, to which the Swabian ministers replied in the *Syngramma Suevicum*. In 1529 he disputed with Luther in the conference at Marburg. He died at Basel, not long after the death of his friend Zwingli. He was remarkable for gentleness of character. His treatise *De Ritu Paschali* and his *Epistola Canonicorum Indoctorum ad Eccium* are the most noted of his works.—See Herzog, *Das Leben des Joh. Œcolampadius* (1843); and Hagenbach's *Œcolampadius* (1859).

ŒCUMENICAL, or ECUMENICAL (q.v.), *ĕk-ū-mĕn'ĭk-al* [Gr. *oikoumenike*, 'of, or belonging to, the *oikoumene*,' 'the world']: term synonymous with general or universal, applied to councils of the entire church: see COUNCIL. The conditions necessary to constitute an œcumenical council are a subject of controversy, which in Rom. Cath. theology assumes importance. See ECUMENIC.

ŒDEMA, ŒDEMATOUS: see EDEMA.

OEDENBURG, *ö'dên-bûrch* (Hung. *Soprony;* anc. *Sempronium*): beautiful town in Hungary, cap. of the county of O., in a fertile plain, on the Ilkva, branch of the Raab. The wine of Rust, a vill. near, ranks next to Tokay. The inhabitants of O. are mostly of German race and Catholics. Pop. 33,500.

ŒDIPUS, *ĕd'ė-pŭs* (Gr. *Oidipous*): hero of a celebrated legend, which, though of the most revolting nature in itself, has supplied both Euripides and Sophocles with the subject-matter of some of their most celebrated tragedies. The story, as generally related, is as follows: Œ. was son of Laius, King of Thebes, by Jocaste; but his father having consulted the oracle to ascertain whether he should have any issue, was informed that his wife would bring forth a son, by whom he (Laius) should ultimately be slain. Determined to avert so terrible an omen, Laius ordered the son which Jocaste bare him to have his feet pierced through, and to be exposed to perish on Mt. Cithæron. In this helpless condition, Œ. was discovered by a herdsman, and conveyed to the court of Polybus, King of Corinth, who, in allusion to the swollen feet of the child, named him *Œdipus* (from *oideō*, I swell, and *pous*, the foot); and with his wife, Merope, brought him up as his own son. Having come to man's estate, Œ. was one day taunted with the obscurity of his origin, and in consequence proceeded to Delphi, to consult the oracle. The response which he received was, that he would slay his father, and commit incest with his mother. To escape this fate, he avoided returning to Corinth, and proceeded to Thebes, on approaching which he encountered the chariot of his father; and the charioteer ordering him out of the way, a quarrel ensued, in which Œ. ignorantly slew Laius. The famous Sphinx (q.v.) now appeared near Thebes, and seating herself on a rock, propounded a riddle to every one who passed by, putting to death all who failed to solve it. The terror of the Thebans was extreme, and in despair they offered the kingdom, together with the hand of the queen, to the person who should be successful in delivering it from the monster. Œ. came forward; the Sphinx asked him, 'What being has four feet, two feet, and three feet; only one voice; but whose feet vary, and when it has most, is weakest?' Œ. replied that it was 'Man;' whereupon the Sphinx threw itself headlong from the rock. Œ. now became king, husband of his mother, Jocaste. From their incestuous union sprung Eteocles, Polynices, Antigone, and Ismene. A mysterious plague now devastated the country, and when the oracle declared that before it could be stayed, the murderer of Laius should be banished from the country, Œ. was told by the prophet Tiresias that he himself had both murdered his father and committed incest with his mother. In his horror he put out his own eyes, that he might no more look upon his fellow-creatures, while Jocaste hanged herself. Driven from his throne by his sons and his brother-in-law, Creon, Œ. wandered toward Attica, accompanied by Antigone, and took refuge in the grove of the Eumenides, who charitably removed him from earth; but the latter part of his life is variously told.

ŒDIPUS TYRANNUS, 'Œdipus the King,' a tragedy by Sophocles (q.v.), played first at Athens about 415 B.C. (See ŒDIPUS.) The same theme was treated in Latin by Seneca, in English by Dryden, and in French by Corneille, Voltaire, Chénier, and Lacroix.

OEHLENSCHLÄGER, *ö-lėn-shlā'gėr*, ADAM GOTTLOB: greatest poet of n. Europe: 1779, Nov. 14—1850, Jan. 20; b. Vesterbro, suburb of Copenhagen. His early years were spent at the palace of Fredericksborg, in the neighborhood of the Danish capital, where his father was employed, first as organist, afterward as steward or bailiff. After a very irregular and desultory education, Oehlenschläger's love of the drama led him to offer his services to the manager of the Copenhagen theatre; but discovering soon that he had no chance of rising above the rank of a mere supernumerary, he entered the Univ. of Copenhagen as a student of law. For a time he seems to have pursued his studies with assiduity, under the direction of his friend, A. S. Oersted, brother of Hans Christian Oersted (q.v.). Oehlenschläger's studies were interrupted 1801, when, on the bombardment of Copenhagen by Nelson and Parker, he and his friends served in the student-corps of volunters. After this event, which roused the dormant patriotism of the nation, Oehlenschläger found the study of law irksome, and turned to the history and mythology of his own country. In 1803 appeared his first collection of poems, including one longer dramatic piece, *St. Hans Aften-Spil*, which attracted favorable notice for the lively fancy with which national habits and local characteristics were portrayed. The *Vaulunders Saga* in the *Poetiske Skrifter*, 1805, and *Aladdin's forunderlige Lampe*, completed his success, and raised him to the rank of the first of living Danish poets; the former of these works having shown a marvelous capacity for reflecting the dark and stern coloring of the old northern Sagas, while the latter evinced a rich and genial poetic fancy. These early efforts were rewarded by a traveling pension, which enabled Oehlenschläger to spend some years in visiting various parts of the continent, and becoming acquainted with the great literary celebrities of the day, such as the Weimar circle of whom Goethe was head. During this period, Oehlenschläger wrote *Hakon Jarl*, the first of his long series of northern tragedies, at Halle (1807; Eng. transl. by F. C. Lascelles, 1875), and *Correggio*, at Rome (1809; Eng. transl. by Theodore Martin, 1854). In 1810 Oehlenschläger returned to Denmark, where he was hailed with acclamation as the greatest tragic poet Denmark had ever known; and having soon afterward obtained the chair of æsthetics at the university, and received various substantial proofs of royal favor, he married, and settled in the capital, where, however, his peace was rudely disturbed by a literary feud with Baggesen, Danish poet and critic, whose poetical supremacy had been superseded by that of Oehlenschläger. In

1819 appeared one of O.'s most masterly productions, *Nordens Guder*, and this and his numerous dramatic compositions about the same period, show that the severe criticism to which his writings had been exposed during the celebrated Baggesen quarrel, had corrected some of the faults, and lessened the self conceit which had characterized his earlier works. His reputation abroad and at home spread with his increasing years; and after having repeatedly visited southern Europe, he went 1829 to Sweden, where his arrival was welcomed by a public ovation. After having received repeated marks of friendship from various sovereigns, he was honored in his own country by the celebration, 1849, of a grand public festival in the palace at Copenhagen. But this ovation was followed in less than two months by his death. His funeral was made a national solemnity, and he was followed to the grave by a civic procession which included members of every class of society from princes to artisans. The fame of O. will rest principally on his 24 tragedies, of which 19 were on northern subjects. These all were composed originally in Danish, and re-written by himself in German. Besides those already referred to, the best are *Knud den Store*, *Palnatoke*, *Axel og Walborg*, *Vœringerne i Miklagord*. His poems are mostly mediocre, and his numerous prose writings deserve little notice. His Danish and German works amount to 62 vols., to which must be added 4 vols. of his *Erindringer*, or *Autobiographical Recollections*, published after his death.

OEHLER, *ö'lèr*, GUSTAV FRIEDRICH: German scholar and theologian: 1812, June 10—1872, Feb. 20; b. Ebingen in Würtemberg. He was a student at Tübingen; lecturer in the Missionary Institution at Basle 1834–37; teacher afterward in the Tübingen Univ.; vicar in Stuttgart, 1840; prof. in the theol. sem. at Schönthal; prof. at Breslau, Silesia, 1845–52; after which he presided over the higher theol. sem. of Tübingen. He contributed many essays to Herzog and Smid's encyclopedia. His books are *Prolegomena zur Theologie des Alten Testamentes* (1845); *Commentationum ad Theologiam Pertinentum* (pars I. 1846); *Die Grundzüge der Altestamentlichen Weisheit* (1854); *Ueber zur Heidnischen Mantik* (1861); *Zwei Seminarreden* (1870); *Gesammelte Seminarreden* (1872); and his chief work, *Theologie des Alten Testamentes* (1873), posthumous, and of great value, containing the substance of his lectures, 1839–71, and translated by E. D. Smith—*Theology of the Old Testament*, Edinburgh, 1874. He is noted for excellence in exegesis. Between the extreme views of those who depreciate the old dispensation as an effete religion, wholly supplanted by the new, and those who regard Christianity as an organic development from the old, he held a medium and conservative place. See *Worte zum Andeken an Dr. G. F. v. Oehler*, 1873, for sketch of his life, with addresses at his funeral.

ŒIL DE BŒUF, *ĕ'ĭl dĕh bŭf* [French, ox's eye]: in *architecture,* a small round or oval opening in the frieze or roof of a large building, which gives light to spaces otherwise dark. The most famous is that in the anteroom (where the courtiers waited) of the royal chamber at Versailles, which gave name to the apartment. Hence the expression, *Les Fastes de l'Œil-de-Bœuf*—i.e., the history of the courtiers of the Grand Monarque, and by extension, of courtiers in general.

ŒLAND, *ö'lânt:* long and narrow island in the Baltic, off the e. coast of Sweden, opposite to, and forming part of, the lān of Kalmar, and 4 to 17 m. from the shore. It is 85 m. in length, 2 to 8 m. in breadth; 588 sq. m. The island, scarcely more than a lime cliff, is scantily covered with soil, but in some parts is well wooded, and has good pasture-ground, which is turned to account by the islanders, who rear cattle, horses, and sheep. In favorable seasons, barley, oats, and flax yield good crops. The fishing is excellent all round the coasts. There are large alum-works on the island, and an extensive line of wind-mills along the range of the Alwar Hills, near which stands Borgholm, founded 1817 (pop. 900), the only town on the island. N. of Œ. lies the steep wooded island-cliff, the Jungfruen, or Blaakulla, which bears the mythical reputation of having been the scene of various deeds of witchcraft, and the favorite resort of wizards and witches.—Pop. of the island Œ., 45,000.

OELS, *ölss:* small town of Prussian Silesia, on a plain on the Oelsa or Oelse, 16 m. e.n.e. of Breslau. Its castle, built 1558, is surrounded by ramparts and ditches. It contains a gymnasium, several churches, and other public edifices. There are manufactures of shoes and of cloth goods. —Pop. 10,600.

ŒNANTHIC, a. *ē-năn'thĭk* [Gr. *oinos,* wine; *anthos,* a flower]: applied to the essential oil or substance which gives wine its characteristic flavor.

ŒNANTHYLIC ACID, *ē-năn-thĭl'ĭk ăs'ĭd* ($C_7H_{14}O_2$): one of the volatile fatty acids of the general formula $C_nH_{2n}O_2$. It is a colorless oily fluid, with aromatic odor, lighter than water, and insoluble in that fluid, but dissolving readily in alcohol and ether. According to Miller (*Organic Chemistry,* 2d ed. p. 355), it may be exposed to a cold of 0° without becoming solid; it boils and may be distilled (with partial decomposition) at 413° F. It is (like many of the allied fatty acids) one of the products of the oxidation of Oleic Acid (q.v.) by nitric acid, and is yielded likewise by the action of nitric acid on castor oil, wax, and various fats. Its most characteristic salt is the œnanthylate of copper, which crystallizes in beautiful green needles.

ŒNOKRINE, n. *ē-nŏk'rĭn* [Gr. *oinos,* wine; *krinō,* I separate]: in *chem.*, the name of a test-paper sold in Paris for the purpose of detecting the fraudulent coloration of wines. It is said that $\frac{1}{100000}$ of magenta in wine is sufficient to give the paper a violet shade.

ŒNOLIN, n. *ē'nol-in:* in *chem.*, $C_{10}H_{10}$: coloring matter of red wine, obtained by precipitating with basic acetate of lead, and exhausting the dried precipitate with a mixture of ether and hydrochloric acid. It is a nearly black powder when dry, insoluble in pure water, but soluble in water containing a vegetable acid, and easily soluble in alcohol.

ŒNOLOGY, n. *ē-nŏl'o-ji* [Gr. *oinos*, wine]: science of wine; that branch of science which deals with the nature, qualities, and varieties of wines.

ŒNOMANIA, n. *ē-nō-mā'nĭ-a* [Gr. *oinos*, wine; *mania*, madness]: insatiable desire for wine or other intoxicating liquors; dipsomania; delirium tremens.

ŒNOTHERA, *ĕn-o-thē'ra* or *ē-nŏth'ē-ra:* genus of plants of nat. order *Onagraceæ* (q.v.), having four petals and eight stamens, the calyx-limb 4-cleft, the segments reflexed; the capsule 4-valved, with many naked seeds. The Evening Primrose (*Œ. biennis*), native of Va., has been known in Europe since 1614, and is now naturalized in many parts of Europe, on the banks of rivers, in thickets,

Evening Primrose (*Œnothera biennis*):
a, flower divested of calyx and corolla to show the parts of fructification; *b*, tuberous root.

on sandy grounds, etc. It is a biennial plant, and produces in the first year elliptic or obovate obtuse leaves, and in the second year a stem 1½—4 ft. high, which bears at its summit numerous yellow flowers in a leafy spike. The flowers are fragrant in the evening. The root somewhat resembles a carrot in shape, but is short; it is usually red, fleshy, and tender; it is eaten in salads or in soups, and as a boiled vegetable. The plant is often cultivated for its large yellow flowers. Several other species of *Œnothera*, natives of N. America, are occasionally cultivated in gardens, and have eatable and pleasant roots.

O'ER, prep. *ōr:* contraction for OVER, which see.

OEREBRO, *ö'rĕ-brô:* inland town of Sweden, cap. of the län of O., at the entrance of the Swart-Elf into the Heilmar Lake, 100 m. w. of Stockholm. The town retains many memorials of its earlier prosperity, when it was frequently the residence of the Swedish rulers, who found its central position in the more fertile southern portion of the kingdom favorable for safety and pleasantness. The old castle was built by Berger Jarl, 13th c.; and was in after-times frequently chosen as seat of the national diets. O. has manufactories of wax-cloth, carpets, woolen goods stockings, guns, and mirrors; and these industrial products, together with the minerals obtained from the neighboring silver, copper, and iron mines, are conveyed to Gothenborg and Stockholm by means of the extensive system of canals which connects the lakes of the interior with the maritime ports. Pop. 22,000.

OERSTED, *ör'stĕd,* HANS CHRISTIAN: scientific discoverer: 1777–1851, Mar. 9; b. at Rudkjobing, on the Danish island of Langeland, where his father was an apothecary. In 1794, he entered the Univ. of Copenhagen, where he took the degree PH.D , 1799, and soon afterward became assistant to the prof. of medicine, in which capacity he gave lectures on chemistry and natural philosophy. In 1806, he was appointed extraordinary prof. of nat. philosophy in the Univ. of Copenhagen. In 1812, he visited Germany and France, and at Berlin wrote his famous essay on the identity of chemical and electrical forces, in which first he developed the principles which were the base of his great discovery of the intimate connection between magnetism and electricity and galvanism. In 1819, in a Latin essay, *Experimenta circa Efficaciam Conflictus Electrici in Acum Magneticam,* addressed to all the scientific societies and leading savans, O. made good his claim as originator of the new science of electro-magnetism. His discoveries formed an era in science, and obtained for him the Copley Medal from the Royal Soc. of England, and the principal mathematical prize in the gift of the Institute of Paris. The leading idea of this great discovery had been in his mind since soon after the discovery of the galvanic battery by Volta. Among his many other chemical discoveries was his demonstration of the existence of the metal aluminium in alumina. Honors increased upon him with his years: he was corresponding member of the French Institute, perpetual sec. to the Royal Soc. of Sciences in Copenhagen, a knight of the Prussian Order of Merit, of the French Legion of Honor, and of the Danish Order of the Dannebrog, and a councilor of state. O. earnestly sought to make science popular among all classes, writing scientific articles for the newspapers and magazines, and giving courses of popular scientific lectures to the general public, besides his university prelections. The majority of his more important physical and chemical papers are in Poggendorff's *Annalen,* and were written by him in German or French, both of which he wrote with the same facility as his own language. At the close of 1850, a national jubilee

was held in honor of the 50th anniversary of his connection with the Univ. of Copenhagen. He died at Copenhagen in the following year. O. is remembered as not only a scientist, but as also a man whose eloquent and earnest advocacy of liberal principles contributed much to the attainment of constitutional freedom in Denmark.

OESEL, *ö'sĕl:* island of Russia, in the Baltic, across the mouth of the Gulf of Riga, and belonging to the govt. of Livonia. It is about 80 m. in length n.e. to s.w., and about 40 m. in greatest breadth, but the s.w. end consists of a comparatively narrow peninsula. A narrow strait separates the n.e. end from the island of Dago. The surface is undulating, broken by low hills, marshy, watered by numerous small streams, and well wooded. The coast is generally high cliffs. The climate is milder than that of neighboring continental districts. The rocks are generally calcareous, and the soil is in many places gravelly; the chief crops are wheat, oats, rye, barley, and peas. The rearing of cattle, horses, and sheep, and fishing are principal occupations of the inhabitants. The seal-fisheries are important. In religion the inhabitants mostly are Lutherans. The only town is Arensburg, on the s.e. coast (pop. about 4,700). Many of the inhabitants of Arensburg are of German descent, as are the nobles and clergy of the island; but the peasantry are Esthonian. The islanders of Oesel were in early times noted as pirates. The Danish king Waldemar conquered the island in the beginning of the 13th c. Albert von Buxhövden, Bp. of Leal in Livonia, obtained it from Denmark 1227, in order that he might reduce its inhabitants to subjection, and convert them to Christianity. Being partly subdued by the Teutonic Knights, it remained more than 300 years under its bishops, the seat of the bishopric being transferred to the island. The last bishop sold it to Denmark 1559. It remained a Danish province till 1645, when it was given up to Sweden, and in 1721, fell into the hands of Russia. Pop. 46,000.

OESER, *ĕ'zĕr*, Adam Friedrich: German artist: b. Pressburg, Saxony, 1717, Feb. 17; d. Leipsic 1799, March 18. He was trained for his profession under the influence of Raphael Donner 1730-9; he afterward was a pupil of Mengs and Dietrich at Dresden where he designed the decorations of the court theatre. Here he made the acquaintance of Winckelmann. In 1764 he was appointed director of the newly founded art school at Leipsic. Besides his professional activity as a teacher he did a great deal of decorative work, and won a reputation as a painter of ceilings. Among other things he executed a picture for the church of Saint Nicholas, and a number of minor decorative panels and drawings. As a sculptor he shows to advantage in the statue of Frederick Augustus the Just in Leipsic and of the Danish Queen Matilda in Celle (Aisne-et-Nord). His versatility is proved by his masterly etchings, 45 in number, some after the manner of Rembrandt, some in a highly orig-

inal style of his own. He shared in Winckelmann's efforts after a reform in art through a study of the antique, but his own canvases give little evidence of Greek influence, and by his passion for allegorical compositions he is sometimes betrayed into the extravagance of the rococo school.

ŒSOPHAGISM, n. *ē-sŏf'a-jĭzm* [L. *œsophagus*, F. *œsophagisme*]: in *pathol.*, the erroneous feeling that one has swallowed a pin or a fish-bone, etc.; spasm of the œsophagus.

ŒSOPHAGUS, n. *ē-sŏf'ă-gŭs* [Gr. *oisŏphăgŏs*, the gullet—from *oisō*, I shall bear or carry for another; *phagein*, to eat]: in *anat.*, the canal through which food and drink pass to the stomach; the gullet. ŒSOPH'AGOT'OMY, n. *-gŏt'ŏ-mĭ* [Gr. *tomē*, a cutting]: the operation of making an opening into the œsophagus or gullet. The *Œsophagus* is a membranous canal, about nine inches in length, extending from the pharynx to the stomach, thus a part of the alimentary canal. It commences at the lower border of the cricoid cartilage of the larynx, descends in a nearly vertical direction along the front of the spine, passes through an opening in the diaphragm, thus enters the abdomen, and terminates in the cardiac orifice of the stomach opposite the ninth dorsal vertebra. It has three coats—viz., an external or muscular coat (consisting of two strata of fibres of considerable thickness—an external, longitudinal, and an internal circular); an internal or mucous coat, covered with a thick layer of squamous epithelium; and an intermediate cellular coat, uniting the muscular and mucous coats. In this tissue are a large number of œsophageal glands, which open on the surface by a long excretory duct, and are most numerous round the cardiac orifice, where they form a complete ring.

The Œsophagus is liable to a number of morbid changes, none however, very frequent.

The most prominent symptom of *Œsophagitis*, or *Inflammation of the Œsophagus*, is pain between the shoulders or behind the trachea or sternum, augmented in deglutition, which is usually more or less difficult, and sometimes impossible. The affection is rare, unless when it originates from direct application of irritating or very hot substances, or from mechanical violence—e.g., from unskilful application of the stomach-tube. The ordinary treatment employed in inflammatory diseases must be adopted; and if inability to swallow exists, nourishing liquids, such as strong beef-tea, must be injected into the lower bowel.

Spasm of the Œsophagus—a morbid muscular contraction of the tube, producing more or less difficulty of swallowing—is much more frequent than inflammation. The spasm generally comes on suddenly during a meal. On attempt to swallow, the food is arrested, and is either immediately rejected with considerable force, or is retained for a time, and then brought up by regurgitation;

the former when the contraction is in the upper part of the canal, the latter when it is near the lower part. In some cases, solids can be swallowed, while liquids excite spasm; in other cases the opposite is observed: but in general either solids or liquids suffice to excite the contraction. An attack may consist of a single paroxysm, lasting only a few hours, or it may be persistent for months or even years. The treatment must be directed to establishment of the general health, by administration of tonics and anti-spasmodics, by attention to the bowels and the various secretions, by exercise in the open air, the shower-bath, nutritious diet, etc.; and by avoidance of excessive use of strong tea, coffee, and tobacco. Care must be taken not to swallow anything imperfectly masticated or too hot; and the occasional passage of a bougie is recommended.

Paralysis of the Œsophagus is present in certain forms of organic disease of the brain or spinal cord which are seldom amenable to treatment. In this affection there is inability to swallow, but no pain or other symptom of spasm; and a bougie may be passed without obstruction. The patient must be fed by the stomach tube, and nutrient injections should be thrown into the lower bowel.

Permanent or Organic Stricture of the Œsophagus may arise from inflammatory thickening and induration of its coats, or from cancerous and other formations either in the walls of or external to the tube. The most common seat of this affection is at its upper part. The symptoms are persistent and gradually increasing difficulty of swallowing, occasionally aggravated by fits of spasm; and a bougie, when passed, always meets with resistance at the same spot. When the contraction is due to inflammatory thickening, it may arise from abuse of alcoholic drinks, or from swallowing boiling or corrosive fluids; and it is said that it has been induced by violent retching in sea-sickness. If unrelieved, the disease must prove fatal, either by ulceration of the tube around the seat of the structure, or by sheer starvation. When the affection originates in inflammation, some advantage may be derived from a mild course of mercury, occasional leeching, and narcotics; and especially from occasional passing of a bougie.

Foreign bodies frequently pass into the Œ., and become impacted there, giving rise to a sense of choking and fits of suffocative cough, especially when they are seated in its upper part. They may not only cause immediate death by exciting spasm of the glottis, but if allowed to remain, may excite ulceration of the parts, and thus cause death by exhaustion. If the body is small and sharp (a fish-bone, e.g.) the patient may rid himself of it by swallowing a large mouthful of bread; if it is large and soft (such as too large a mouthful of meat), it may usually be pushed down into the stomach with the probang; while large hard bodies (e.g., pieces of bone

should be brought up either by the action of an emetic or by long curved forceps. If the offending body can neither be brought up nor pushed down, it must be extracted by the operation of *Œsophagotomy,* which can be performed only when the impacted body is not very low down.

ŒSTRIDÆ, *ĕs'trĭ-dē:* family of dipterous insects, having a mere rudimentary proboscis or none, the palpi also sometimes wanting, and the mouth reduced to three tubercles; antennæ short and inclosed in a cavity in the forepart of the head; abdomen large. They are generally very hairy, the hair often colored in rings. They resemble flesh-flies in general appearance, and are nearly allied to *Muscidæ.* The perfect insect is very short-lived. The females deposit their eggs on different species of herbivorous mammalia, each insect being limited to a particular kind of quadruped, and selecting for its eggs a situation on the animal suitable to the habits of the larva, which differ in different species, though the larvæ of all are parasites of herbivorous quadrupeds. For the characters and habits of some of the most notable species see Bot. Animals seem generally to have a strong instinctive dread of the Œstridæ which infest them.

ŒTA, *ē'ta,* Mount: mountain on the s. boundary of anc. Thessaly (q.v.).

OETTINGEN, *öt'tĭng-ĕn:* ancient co. in Germany existing in the 13th c. in the Riesgau, Swabia. It is now mediatized. Since 1806, part of the territory has belonged to Bavaria, and since 1810, part to Würtemburg. Wallerstein, chief town of the latter portion, is famous for its palace and its library containing 100,000 vols. It is now in the Bavarian dist. of Neuburg and Swabia.

OF, *ŏf:* another form of the prefix Ob, which see.

OF, prep. *ŏv* [L. *ab;* Icel. *af;* Gr. *apo;* Skr. *apa;* AS. *of,* from, of]: from; proceeding from; out of; belonging to; concerning; denoting possession or property; according to; denoting properties; qualities, or condition; in OE., by; noting change from. Off, a. *ŏf,* denoting distance; in *driving,* applied to the right-hand side: Ad. from; away; not toward; distant from; denoting the action of removing or separating, as to cut *off:* Prep. not on: Int. away; begone; among *seamen,* abreast of or near. Be off, away; depart. From off, denoting removal. Ill off, or Badly off, having fared ill; in a state of poverty. Off and on, at one time anxious, at another careless, about anything. Off-cut, the part of a printed sheet cut off and inserted in the middle of the remainder. Off-hand, without preparation or hesitation; without respect. Off-side, the right-hand side; the left-hand side being called the *near side.* Of late, recently. Of old, formerly; in time long past. To be off, to depart; to recede from an intended contract or

design. To COME OFF, to escape; to fare in the event; to happen, as, the race came off. To GET OFF, to alight; to come down; to make escape. To GO OFF, to depart; to desert; to take fire and be discharged, as a gun. To TAKE OFF, to take away; to mimic. WELL OFF, having fared well; in good circumstances. To STAND OFF AND ON, among *seamen*, to sail near to and away from the land alternately; on different tacks.

O'FALLON, *ō-făl'lon*, JOHN: 1791, Nov. 23—1865, Dec. 18; b. Louisville, Ky.; son of Dr. James O'F., who emigrated to Wilmington, N. C., 1774. The son served under Gen. William H. Harrison, and was wounded at Tippecanoe. He fought also in the war of 1812. He acquired a fortune as a merchant in St. Louis, Mo., and gave more than $1,000,000 to charitable and educational institutions, including the endowment of $100,000 to the O'Fallon Polytechnic Institute, now part of St. Louis Univ. He gave liberally to Washington Univ. also, and built a medical coll. and a dispensary. He died in St. Louis.

O'FEN: see BUDA.

OFF: see under OF.

OFFAL, n. *ŏf'făl* [prov. Ger. *affall*, refuse or dross: Dan. *affald*, a falling away, offal]: that which is thrown away as of no value, as certain parts of an animal butchered; refuse; coarse meat; rubbish. *Note.*—OFFAL was formerly used of chips of wood falling from a cut log, and is merely compounded of OFF and FALL—see Skeat.

OFFA'S DYKE, *of'faz dīk:* remarkable relic of antiquity, an intrenchment extending along the whole border of England and Wales, from the n. coast of Flintshire, on the estuary of the Dee, through the counties Denbigh, Montgomery, Salop, Radnor, and Hereford, into Gloucestershire, where its s. termination is near the mouth of the Wye, in the grounds of Sedbury Park, which overlook the estuary of the Severn. In some places, it is nearly obliterated by cultivation; in others, it is of considerable height, though its appearance nowhere indicates that it can ever have been of much value as a rampart. It is therefore generally supposed to have been intended chiefly as a line of demarkation. Nearly parallel with it, but at a distance varying from a few hundred yards to three m., on the e. or English side of it, is *Watt's Dyke*, a similar relic of antiquity, though seeming never to have been so great a work, and now in many places obliterated. It has been conjectured that the space between was neutral ground where the Anglo-Saxons and Welsh met for trading or other purposes. The principal dyke is ascribed by tradition to Offa, King of Mercia, who reigned in the 8th c.; but this is tradition, and not history.

OFFENBACH, *of'fĕn-bâch:* manufacturing town of Hesse-Darmstadt, on the s. bank of the river Main, within the domains of the Princes of Isenburg-Birstein, 4 m. s.e. of Frankfurt. Pop. about 50,000. O. is pleasantry situated in one of the richest parts of the valley of the Main, and is one of the most important manufacturing towns in the province. Among industrial products, its carriages have acquired high repute; and next to these, its bookbindings, articles of jewelry, gold and silver goods, carpets, and silk fabrics. It has also good manufactories of wax-cloth, papier-mâché snuff-boxes, tin-lacquered wares, umbrellas and parasols, wax candles, leather, hats, tobacco, sugar, and ginger-bread and spiced cakes. O. has several churches, and a Jewish synagogue. The palace is the winter residence of the Isenburg-Birstein family, to whom the old castle, now in ruins, belongs. A pontoon-bridge crosses the river, and there is a railway to Frankfurt.

OF'FENBACH, JACQUES: 1819, June 21—1880, Oct. 4; b. Cologne, of Jewish parentage: a naturalized Frenchman, composer of dramatic music highly popular over the continent of Europe. He studied music in Paris 1833, was admitted, as violoncellist, to the orchestra of the Opéra Comique 1834; exercised great tact, quickness of perception of popular taste, and amazing industry; became *chef d'orchestre* in the Théâtre Français 1847; and 1855 opened the Bouffes Parisiens (formerly the Théâtre Comte). Here his brilliant trifles drew crowds, and his success as introducer of a new form of opera bouffe culminated 1867 in *La Grande Duchesse de Gérolstein*, which captured the public in Europe and America. Other of O.'s popular burlesque operas are *Orphée aux Enfers*, *La Belle Hélène*, *La Barbe Bleu*, *Geneviève de Brabant*. He composed also numerous light lively operettas. O. worked to suit the popular taste, or to lead that taste into paths instantly acceptable to it. His work was not educational in a good sense; it was brilliantly diverting. It lacks refinement, high aim, and artistic principle. It had for its object the gaining of popular favor, and its success in this was complete.

OFFENCE: see OFFENSE.

OFFEND, v. *ŏf-fĕnd'* [F. *offendre*, to offend, to hurt—from L. *offendĕrĕ*, to strike or dash against a thing: It. *offendere*]: to pain; to annoy; to displease; to affront; to sin; to cause dislike or anger; to commit transgression. OFFEND'ING, imp.: ADJ. displeasing; causing anger; committing sin. OFFEND'ED, pp.: ADJ. displeased. OFFENDER, n. *ŏf-fĕnd'ĕr*, one who gives offense; a criminal; a guilty person.—SYN. of 'offend': to anger; assail; attack; transgress; violate; injure; vex; mortify; shock; wound; scandalize.

OFFENSE, n. *ŏf-fĕns'* [F. *offense*—from L. *offensārĕ*, to strike or dash against a thing; *offensa*, an injury, an offense: It. *offensa*]: displeasure given or received; affront; injury; cause of sin; a sin; a fault; a crime. OFFENSE'LESS, a. *-lĕs*, free from a disposition to offend. OFFENSE'LESSLY, ad. *-lĭ*. OFFENSIVE, a. *ŏf-fĕn'sĭv*, tending to cause offense, pain, or disgust; rude; insulting; used in attack; assailant; making the first attack: N. the part of attacking; a state or posture of attack. OFFEN'SIVELY, ad. *-lĭ*. OFFEN'SIVENESS, n. *-nĕs*, the quality or condition of being offensive; unpleasantness. TO ACT ON THE OFFENSIVE, to be the attacking party.—SYN. of 'offense': wickedness; transgression; displeasure; scandal; outrage; anger; attack; umbrage; resentment; misdeed; misdemeanor; trespass; delinquency; indignity; insult;—of 'offensive': displeasing; disgusting; injurious; disagreeable; distasteful; obnoxious; abhorrent; impertinent; saucy; attacking; scurrilous; abusive; insolent; opprobrious.

OFFENSES AGAINST RELIGION, PUBLIC PEACE, ETC.: see RELIGION: PEACE: ETC.

OFFENSIVE, OFFENSIVELY: see under OFFENSE.

OFFER, n. *ŏf'fĕr* [L. *offerrĕ*, to bring or thrust forward —from *ob*, in the way; *fero*, I bring: It. *offerire:* F. *offrir*]: a proposal; first advance; the act of bidding a price; the sum bid: V. to make a proposal to; to present either to be accepted or rejected; to present in prayer or worship; to sacrifice; to bid, as, a price or reward; to exhibit; to attempt or make an attempt, as, they *offered* to land; to present itself; to declare a willingness. OF'FERING, imp.: N. that which is offered; a gift presented at the altar as an act of worship (see FIRST-FRUITS: SACRIFICE: OFFERTORY); certain customary payments to the clergy. OFFERED, pp. *ŏf'fĕrd*. OF'FERER, n. *-ĕr*, one who offers. OF'FERABLE, a. *-ă-bl*, that may be offered. OFFERING DAY, in the *Anglican Church*, a day of customary alms and offerings for the poor. The custom, still to some extent retained, is observed on Christmas day, Easter day, and on two other days, of which Whitsunday is often one.—SYN. of 'offer, v.': to present; immolate; bid; attempt; commence; propose; give; propound; move; proffer; tender.

OFFER AND ACCEPTANCE: one mode of entering into a contract of sale. At an auction, the highest offer is generally accepted as a matter of course; and when accepted, the contract is complete. An offer is often made by letter from one merchant to another to buy or sell goods. In such a case, the party offering is bound to await an answer by return of post or other means of message, and later than such return where there are several mails in a day; for until after some reasonable time for reply, the offer is supposed to be continuously made. But if A offer to B personally to sell, and B ask time to consider for a day, or any given time, A is not in usual cases bound to grant such time beyond the termination of the interview.

OFFERTOIRE, *ŏ-fĕr-twar':* French for Offertory (q.v.).

OFFERTORY, n. *ŏf'fĕr-tĕr-ĭ* [F. *offertoire*, an offertory—from *offrir*, to offer: mid. L. *offertōrĭŭm*, a place to which offerings were brought, an offertory (see OFFER)]: that which is offered; the sentences in the Communion service read in church while the alms are collecting; the alms collected as a part of public Divine service. Offertory is the name given to that portion of the public liturgy of the Rom. Cath. Chh. with which the eucharistic service, strictly so called, commences. In the Roman Liturgy it consists of one or two verses from some book of Scripture, usually the Old Test., but sometimes from the Epistles. In the Ambrosian Liturgy it consists of a prayer, similar in form to the *collect* or *secret* of the mass; and in both, this recital is followed by the preparatory offering up of the bread and wine, accompanied by certain ceremonies and forms of prayer.

This offering of the bread and wine in the public service became, from a very early period, the occasion of a voluntary offering, on the part of the faithful; originally, it is probable, of the bread and wine designed for the eucharistic celebration and for the communion of the priest and the congregation (sometimes including also the absent members), also for the *agape* or common sacred feast which accompanied it. That portion of the offerings which remained in excess of what was requisite for these purposes was applied to the relief of the poor, and to the support of the clergy. These offerings were made ordinarily by the faithful in person, and were laid upon the altar; and the Ambrosian rite still preserves this usage in the ceremonial of the cathedral of Milan. By degrees, other gifts were added to those of bread and wine—as corn, oil, wax, honey, eggs, butter, fruits, lambs, fowl, and other animals; and eventually equivalents in money or other objects of value. The last-named class of offerings, however, was not so commonly made upon the altar and during the public liturgy, as in the form of free gifts presented on the occasion of other ministerial services, as baptism, marriages, funerals, etc.; and from this has arisen the practice in the Rom. Cath. Chh. of the mass-offering, or *honorarium*, which is given to a priest with the understanding that he shall offer the mass for the intention (whence the honorarium itself is often called an 'intention') of the offerent. In some places, however, and among them in parts of Ireland, offerings 'in kind' are still in use, not indeed in the form of the ancient offertory, but in the shape of contributions of corn, hay, etc., at stated seasons, for the use of the parochial clergy. At weddings also, and in some places at funerals, offerings in money are made by the relations and friends of the newly married or of the deceased. In the Liturgy of the English Church, allusion is made to the practice of oblations, and some recent controversies have related to the revival of the ancient 'offertory,' which has found some advocates.—The O. is coming into use in non-prelatical churches in the simple form of a few dedicatory words recognizing and rendering the contributions of the congregation as their offering to God.

OFFICE, n. *ŏf'ĭs* [F. *office*, office, worship—from L. *offĭcĭŭm*, service, duty—from *opem*, aid, help; *facĕrĕ*, to do: It. *officio*]: settled duty; employment; business: peculiar use or function: act of kindness: formulary of worship or devotion; act of worship: house or apartment where commercial men, etc., transact their business; a counting-house: a function; position or function of one in public administration; department, as of state: PLU. the outlying parts, as stables, etc., of a mansion or palace. OFFICE-BEARER, one who holds an office. OFFICER, n. *ŏf'fĭ-sẽr*, one authorized to perform some public duty (see OFFICE, in Law); one holding a place of authority in the army and navy.—*Military Officers* are combatant and non-combatant—non-combatant including Paymasters (q.v.), medical officers (see SURGEON, ARMY AND NAVY), Commissariat (q.v.) and other civil officers. The great divisions of rank are commissioned (see COMMISSIONS), warrant, and Non-commissioned Officers (q.v.). Commissioned officers comprise all holding the rank of sub-lieut., or corresponding or superior rank. Divided by duties, they are Staff Officers (see STAFF), or Regimental Officers (see REGIMENT); divided by rank, General Officers (q.v.), Field-officers (q.v.), and troop or company officers. The last are captains, lieutenants, and sub-lieutenants, and, except in the cavalry, are unmounted.—See PROMOTION. ARMY: PURCHASE SYSTEM: WARRANT OFFICERS: NON-COMMISSIONED OFFICERS: also titles of the various ranks. —*Naval Officers* are commissioned, warrant, and petty officers. Commissioned officers are admirals, captains, commanders, lieutenants, and sub-lieutenants: see these titles. Warrant Officers (q.v.) are boatswains, carpenters, gunners, and one class of engineers. Petty Officers (q.v.) constitute an important portion of the management in a ship-of-war. OFFICER, v. to furnish or supply with officers. OF'FICERING, imp. OF'FICERED, pp. *-sẽrd*: ADJ. furnished or supplied with officers. OFFICIAL, a. *ŏf-fĭsh'ăl* [F.—L.]: pertaining to or derived from the proper office or authority; done by virtue of authority: N. one invested with office; a subordinate executive officer or attendant. OFFI'CIALLY, ad. *-lĭ*, by authority; by virtue of an office. OFFICIATE, v. *ŏf-fĭsh'ĭ-āt*, to act by virtue of an office; to perform official duty for another, said of a clergyman; in *OE.*, to give in consequence of office. OFFI'CIATING, imp.: ADJ. performing an office. OFFI'CIATED, pp. OFFICIOUS, a. *ŏf-fĭsh'ŭs* [L. *officĭōsus*, obliging]: unduly forward in interposing services; intermeddling; busy; in *OE.*, doing good offices; kind. OFFI'CIOUSLY, ad. *-lĭ*. OFFI'CIOUSNESS, n. *-nĕs*, the quality of being officious: undue forwardness. OFFICE COPY, an official copy: in *law*, copy made of a document by some officer of a court in whose custody the document is: in general such copies are receivable in evidence without further proof in the same court, but not in other courts except as some statute makes them evidence. OFFICE FOUND: see INQUEST OF OFFICE. OFFICIAL ASSIGNEE, a public officer appointed to manage the estate of a bankrupt: where the

law provides such an official, a bankrupt's estate vests in him as soon as an adjudication of bankruptcy is made. He is the manager of the property, and can sell the estate under the directions of the court in urgent cases, e.g., when the goods are perishable; but in general he is assisted in the management by the creditors' assignees selected from the body of creditors by the other creditors' votes. OFFICIAL MANAGER, an officer appointed to manage the winding up of the affairs of a joint-stock company. DIVINE OFFICE, the name popularly given to the CANONICAL HOURS (q.v.) prescribed to be read each day by bishops, priests, deacons, and sub-deacons in the Roman Cath. Chh.: see BREVIARY. The special portions assigned for any particular day constitute what is called the divine office for that day; and each person who is bound in virtue of his order to recite the Breviary, is obliged, under pain of sin, to read, not merely with the eye, but with distinct, though it may be silent, articulation, each and all these portions. The adjustment of the portions of the office of each day, the combination of the 'ordinary' portions which are read every day in common, with the parts 'proper' for each particular day, is a matter of considerable difficulty, and is regulated by a complicated system of RUBRICS (q.v.). HOLY OFFICE, applied popularly to the Inquisition; properly to *The Congregation of the Holy Office*, i.e., the 'Congregation' at Rome, to which the direction of the tribunal of the Inquisition at Rome is subject. This Congregation was established by Paul III. 1542, and its organization was completed by Sixtus V. It consists of 12 cardinals, a commissary, consulters, and qualifiers, whose duty it is to examine and report on each case for information of the cardinals. In the most solemn sessions of the Holy Office the pope himself presides in person. The Holy Office decides questions of heresy, inquires into crimes against faith, and judges ecclesiastical offenses, especially in administration of the sacraments. In the present condition of the papal court, its action is much restricted. See INQUISITION.—SYN. of 'officious': impertinent; meddling; active; meddlesome; forward.

OFFICE, in Law: duty and right to exercise a public function or employment, and to take the fees and emoluments belonging to it. It involves the idea of tenure, duration, fees or emoluments, and powers, as well as duty. An officer is one lawfully invested with an office. Every O. is considered public whose duties concern the public. The holding of O. at a fixed compensation creates no vested right in the incumbent; the law creating the O. and the compensation is in no sense a contract; the offices may therefore be abolished at any time by proper legislation, or the salary may be decreased, or the powers and duties of the O. may be curtailed, unless such legislation is expressly forbidden by the constitution. Offices cannot be bought or sold, nor are they subject to devise; in most states it is a penal offense to barter away for reward the compensation or a part thereof attached to the O., or to allow another not authorized by law to exercise the func

tions of the O., either directly or indirectly. Offices are either ministerial or judicial: ministerial, when the duties attached are definitely fixed and ascertained and do not involve the exercise of any judicial discretion; judicial when the duties require the exercise of judgment or discretion on the merits of the question presented: an example of the ministerial kind is a constable; the office of a judge is judicial. The same officer may exercise judicial and ministerial duties; e.g., a justice of the peace. This distinction is of importance on account of the nature of the responsibility attached to the two classes. An officer performing ministerial duties is always responsible for any neglect or violation of duty whereby injury is caused to others: an officer, exercising judicial functions and having jurisdiction of the matter on which he acts, incurs no liability for injuries, if he acts with good faith; but he will be civilly responsible if he acts wholly without jurisdiction, or exceeds his jurisdiction and has knowledge of the facts which constitute the defect of jurisdiction. Where a public O. is instituted by the legislature, implied authority is conferred on the officer to bring all suits which the proper and faithful discharge of his official duties requires. An officer *de facto* is one in possession of the O., and receiving the emoluments attached thereto, but whose title is not unquestionable; an officer *de jure* is one who has the legal right to the O., without necessarily having the actual possession of it. There can not be an officer *de jure* and another *de facto* performing the duties of the O. at the same time, but where the officer *de jure* is also officer *de facto*, the acts of another claimant will not protect third persons. A *de facto* officer can not be compelled to act and incurs no liability by his mere cessation of acting. The acts of some officers *de facto* will be effectual and valid, even though they be afterward replaced by the officer *de jure*. Thus the judgments rendered by a judge acting as such, *de facto*, will not be set aside for that reason. The title to O., when in dispute, is generally tested by what are termed *quo warranto* proceedings. The tenure of O. is regulated by statute, and it is usual in the United States to fix a limit for eligibility on the age of incumbents; 70 years usually being the limit. In the absence of fraud or collusion, the acts of public officers, within the limits of the authority conferred on them and in performance of the duties assigned to them in dealing with third persons are the acts of the states. In the United States, public officers are appointed by the pres. with the advice and consent of the senate, except that congress has power to vest in the pres. alone or in the heads of departments, the appointment of 'inferior officers.' The constitution is silent as to whether the consent of the senate is necessary to the removal of an officer by the pres.; congress, in the trial for impeachment of Pres. Johnson, sustained by a very close vote, the right of the pres. to act alone. The appointment and removal of a number of 'inferior officers' is now regulated by what is known as the 'Civil Service Reform' laws. A number of

the states have similar statutes: see CIVIL SERVICE. Ambassadors (q.v.), public ministers, consuls (q.v.), and Supreme court judges, are specified by the constitution of the United States as not being 'inferior officers.' Each state has statutes regulating the appointment of its own officers; in the states most of the officers, especially the head officers, are elected by the people. The tendency has been, in the states, to curtail the power of appointment in the executive.

OFFICINAL, a. *ŏf-fĭs'ĭ-năl* [It. *officinale:* F. *officinal*, sold in the shops—from L. *off'ĭcīna*, a shop where goods are sold]: kept and sold in shops, or ordered or expected to be kept and sold there. OFFICINAL DRUGS, those medicinal substances which have place in the pharmacopœias of different countries, and which are therefore sold—or some of their products or preparations of them—by apothecaries and druggists.

OFFING, n. *ŏf'fĭng* [Eng. *off*, signifying distance from]: that part of the sea at a distance from the shore having deep water: ADJ. moving off shore; steering from land.

OFFSCOURING, n. *ŏf'skowr-ĭng* [*off*, and *scour—lit.*, anything scoured off]: rejected matter; that which is vile or despised.

OFFSCUM, n. *ŏf'skŭm* [*off* and *scum*]: refuse matter; filth: ADJ. vile.

OFFSET: a perpendicular from a main line to an outlying point. Let AEF....B....D....C be a field with

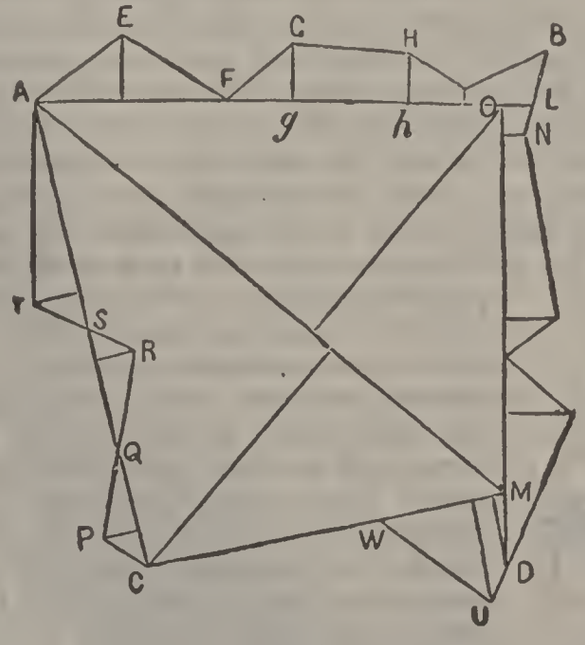


Fig. 1.

very irregular sides; take the points A, O, M, C at or as near the corners as convenient, the object being to inclose as much of the field as possible within the quadrilateral AOMC; and for this purpose it is sometimes necessary, as in the present case, to include a corner (as SRQ) which is

outside the field. The area AOCD is found by means of the diagonal AM, and the perpendiculars on it from C and O. The area AEFG....BL is found by dividing it into triangles and trapezoids by means of perpendiculars (to which the term *offsets* was originally applied, though it now denotes the irregular area before mentioned) from the corners E, G, H, etc. (see TRIANGLE: TRAPEZOID), and adding together the areas of the separate figures AEF, FG*g*, GH*gh*, etc. Similarly the areas of OLN....D and MDUW are found. To the sum of these must be added the areas of the triangles ATS, QPC, diminished by the area of SRQ, and the result is the whole area of the field. If the offset have no distinct corners, as (fig. 2) ABLMN ....OK, then the base AK is divided into equal parts by

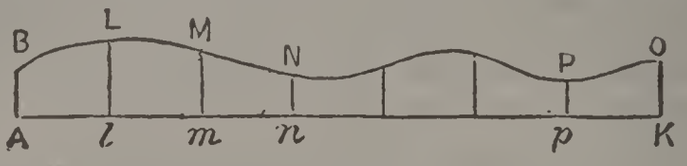
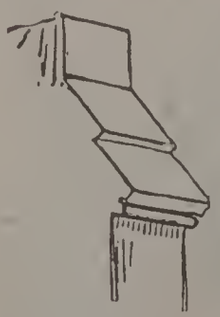


Fig. 2.

perpendiculars AB*l*, M*m*, N*n*, etc., and the area of the offset is found approximately as follows: the whole offset $= \mathrm{ABL}l + \mathrm{L}l\mathrm{M}m + \mathrm{M}m\mathrm{N}n + \text{etc.} + \mathrm{P}p\mathrm{OK} = \mathrm{A}l \times \frac{1}{2}(\mathrm{AB} + \mathrm{L}l) + lm \times \frac{1}{2}(\mathrm{L}l + \mathrm{M}m) + mn \times \frac{1}{2}(\mathrm{M}m + \mathrm{N}n) + \ldots + p\mathrm{K} \times \frac{1}{2}(p\mathrm{P} + \mathrm{OK}) =$ (since the divisions of the base are equal) $\mathrm{A}l \times \frac{1}{2}\{\mathrm{AB} + 2\mathrm{L}l + 2\mathrm{M}m + 2\mathrm{N}n + \ldots + 2p\mathrm{P} + \mathrm{OK}\} = \mathrm{A}l \times \left\{\frac{\mathrm{AB} + \mathrm{OK}}{2} + \mathrm{L}l + \mathrm{M}m + \mathrm{N}n + \ldots + \mathrm{P}p\right\}$; i.e., the area of an offset is found approximately by adding the intermediate perpendiculars to the semi-sum of the first and last, and multiplying the sum-total by the length of a division of the base, the divisions being equal; and the greater the number of perpendiculars, the nearer the result is to the true area.

OFFSET, n. *ŏf'sĕt*, or SET-OFF [*off*, and *set*]: sum or account or thing placed as an equivalent for another. In *building*, the splay or sloping part of a wall, etc., joining parallel surfaces when the upper face recedes from the lower. This frequently occurs on buttresses (see fig.). The O. is usually protected with dressed stones, having a projection or drip on the lower edge to prevent the rain from running down the wall. In *gardening*, a young shoot or bulb separated from the parent root and growing beside it, springing from the axils of its scales (see BULB): this growth exhausts the plant's strength, but serves for its propagation; the term is seldom applied to other than bulbous-rooted plants cultivated for beauty of flowers.—O. signifies also a terrace upholding a flat on a hillside. O. in *land-measuring* (see below): V. to set off, as one account against another. OFFSET-STAFF, a measuring rod 10 links long, or 6 ft. 7·2 inches.



Offset.

OFFSHOOT, n. *ŏf'shôt* [*off*, and *shoot*]: anything arising from or growing out of another.

OFFSIDE, n. *ŏf'sīd* [*off*, and *side*]: the side to the right hand of the driver.

OFFSKIP, n. *ŏf'skĭp* [*off*, and Dut. *-schap;* AS. *-scipe*, a suffix = Eng. *-ship*, as in friendship]: a term used by writers on art to indicate that part of a landscape which recedes from the spectator into distance.

OFFSPRING, n. *ŏf'sprĭng* [*off*, and *spring*]: children; descendants; that which is produced from something else.

OFFWARD, ad. *ŏf'wërd* [*off*, and AS. *weard*, expressing direction]: in *nav.*, the situation of a ship which lies aground, and leans from the shore.

OFT: for Often, which see.

OFTEN, ad. *ŏf'fn* [Icel. *opt;* Dan. *ofte;* Goth. *ufta*, often]: many times; repeatedly; not seldom. Oft, ad. *ŏft*, poetic for *often*. Oftentimes, or Ofttimes, ad. frequently.

O'GAM: see Ogham.

OGDEN, *ŏg'dĕn:* city, cap. of Weber co., Utah, at the union of the Ogden and Weber rivers; on the Union Pacific, the Rio Grande Western, the Central Pacific, the Utah Central, the Ogden and Syracuse, the Echo and Park City, and the Utah and Northern railroads; near the Wasatch Mountains and 37 m. from Salt Lake City. It is on a great plain, 4,340 ft. above the ocean, 85 ft. above Great Salt Lake 6 m. distant. The city is 4 m. square, the streets cross each other at right angles, and, except the principal business thoroughfare, 132 ft., are 100 ft. wide. The streets are paved with asphalt, found in inexhaustible quantity in one of the mountains close by; they have broad walks and are well shaded. There are street railroads, light is supplied by gas and electricity, and O. has an excellent system of waterworks, telephone, and other public services, public graded schools with institutions of higher learning, Weber State Acad. (Mormon), and Sacred Heart Acad. (Rom. Cath.). It is also the seat of the State Industrial School (reformatory), of state institutions for the deaf, dumb, and blind, and has many fine churches. There are national, state and savings banks, newspaper offices, and among other fine buildings are the Chamber of Commerce, the Union depot, municipal building, opera-house, and a hotel which cost $150,000. O. is the outlet for the products of an extensive and fertile agricultural, live-stock, and fruit-growing region, which has been increased by the largest irrigating canal in the world, on which 3,000 men were employed, which opened 500,000 acres of land to cultivation, and cost $3,000,000. The city is the centre of extensive trade. Iron, copper, lead, silver, and gold are found in the vicinity; there are enormous quantities of coal; large deposits of manganese, fire-clay, kaolin, and mineral resin; and marble, granite, and sandstone of various shades and fine qualities are found in abundance. Salt,

and various sulphates, borates, and bromides are obtained from the lake, and lime from the mountains, at very small expense. The Odgen river in its passage through the cañon falls about 550 ft. in a distance of 5 m., giving immense water-power. The manufacturing interests are varied, extensive, and rapidly increasing. The largest flour-miils in the region are here; brick, tile, and pottery ware are made in great quantities. Among the manufactures are lumber, woolen and knit goods, boots, shoes, cigars, and brooms. There are also canning establishments, breweries, and vinegar factories. On account of its fine climate and remarkably equable temperature, O. has become a favorite health resort. The waters of the famous hot springs are claimed to be wonderfully efficacious in certain forms of scrofula, rheumatism, and other diseases; while bathing in Great Salt Lake is highly invigorating. O. was settled by Mormons 1848, was incorporated 1859, and has recently had wonderful growth. It is said that in a period of 18 months the pop. has more than doubled, and that $1,500,000 has been expended on private buildings within a year. Pop. (1870) 3,127; (1880) 6,069; (1890) 14,889; (1900) 16,313; (1910) 25,580.

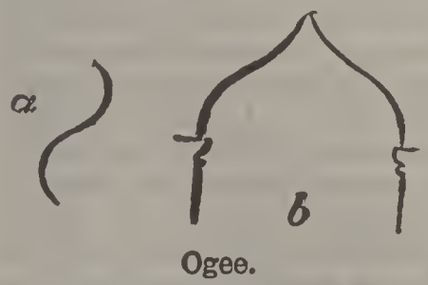
OGDEN, *ŏg'dĕn*, AARON: 1756, Dec. 3—1839, Apr 19; b. Elizabethtown, N. J.; son of Robert O., colonial patriot and statesman. Aaron graduated at Princetown 1773, and afterward taught school. He served in the revolutionary war as aide-de-camp to Lord Stirling and Gen. Maxwell, and accompanied Lafayette in his Virginia campaign 1781, receiving special commendation from Washington for gallant conduct at Yorktown. After the war, he studied law, and practiced successfully in his native state; holding, meanwhile, several important military and political appointments. He was U. S. senator 1801–03 and chosen gov. of N. J. 1812, Oct. 29. In 1806 he was one of the N. J. commissioners to settle the question of boundary and jurisdiction between N. Y. and N. J. He was commander-in-chief of the N. J. militia in the war of 1812, declining the appointment of maj.gen. U. S. A. He served as trustee of Princeton 1803–12 and 1817–39, receiving the degree LL.D. from that college 1816. He was pres.general of the Soc. of the Cincinnati from 1829 till his death in Jersey City.

OG'DEN, DAVID: 1707–1800, June; b. Newark, N. J. He graduated at Yale 1728, studied law in New York, and became the leader of his profession in N. J. He was chosen a member of the royal provincial council, 1751, Apr., served as judge of the superior court, and 1772 was appointed a judge of the supreme court, which position he held till the outbreak of the revolutionary war. His sympathy with the mother country compelled him to seek refuge in England, 1777, Jan., and in 1779 he became an active member of the board of refugees, consisting of representatives of the several colonies, and drew up a plan for their government in the event of their surrender to Great Britain. His own estates, valued at $100,000, and those of other loyalists having been confiscated, he went to England

again, 1783, to urge their claims for compensation. He returned to the U. S. 1789, having secured an allowance for his property, and settled at Whitestone, Long Island, N. Y., where he passed the remainder of his life.

OGDENSBURG, *ŏg'dĕnz-bĕrg:* city and port of entry in St. Lawrence Co., N. Y.; on the St. Lawrence river, at the mouth of the Oswegatchie; 72 m. below Lake Ontario, and 4 m. above the rapids; it is about 175 m. n.w. of Albany, opposite Prescott, Canada, and is the terminus of the Rome Watertown and Ogdensburg, the Utica and Black River, and the Ogdensburg and Lake Chaplain railroads, the last being a division of the Vermont Central. The St. Lawrence is more than 2 m. wide at this point. Steam ferry-boats run between O. and Prescott, and O. is also headquarters for the Northern Transportation Co.'s line of 23 steamers connecting Chicago with O., and touching at other points on the great lakes. The commerce of O. is important, grain and lumber being chief sources of revenue. It has an immense grain elevator, and it is estimated that 10,000,000 bushels of grain pass through this port annually, from the west to New England. The annual lumber receipts are about 75,000,000 ft. The water-power is excellent, and is employed in the manufacture of flour, lumber, machinery, and leather. The city is level, regularly laid out, beautifully shaded, and lighted with gas; it has the Holly system of water-works. The principal public buildings are the U. S. post-office, custom-house and court-house, and the Rom. Cath. Cathedral, other fine churches, graded schools, and an Educational Inst.; there are also handsome parks. O. was founded 1749, incorporated as a vill. 1817, and became a city 1868. Pop. (1900) 12,633; (1910) 15,933.

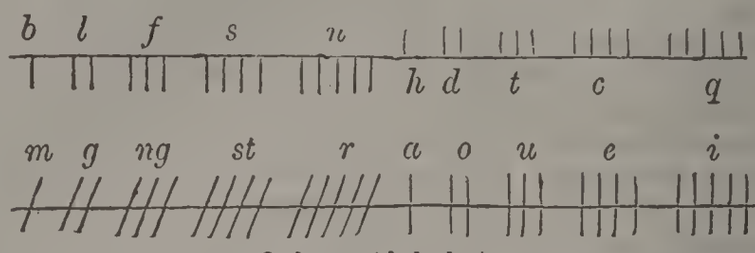
OGEE, n. *ō-jē'* [F. *ogive;* It. *augivo,* the arch of a ceiling]: wave-like molding of two curves, one concave, the other convex (*a*); the union of the concave and convex in an arch or fillet; a cyma; contracted into O.G. It is called (in Classic Architecture) *Cymatium* or *Cyma Reversa* (see MOLDING) The ogee is much used in Gothic architecture also. An arch having each side formed with two contrasted curves, an arch with a double curve, is called an ogee arch (*b*). Figure *a* represents Hogarth's line of beauty.



Ogee.

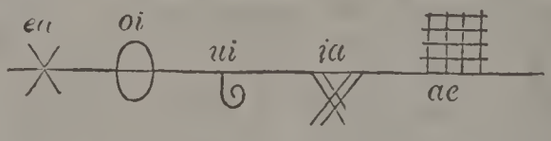
OGHAM, n. *ŏg'hăm,* or OGAM [Ir. *ogam* or *ogma*]: kind of shorthand writing or cipher, in use among the anc. Irish: see CELTIC NATIONS. The name Oghams was given to the letters or signs of a secret alphabet long in use among the Irish and some other Celtic nations. Neither the origin nor the meaning of the name has been satisfactorily explained. The alphabet itself is called *Bethluisnin,* or *Bethluis,* from its first two letters, '*b*,' called '*beith*'

(birch), and '*l*,' called '*luis*' (quicken). Its characters are lines, or groups of lines, deriving their significance from their position on a single stem or chief line—over, under, or through which they are drawn either straight or oblique. In some cases the edge of the stone or other substance on which the Oghams are incised serves the purpose of the stem or chief line. About 80 different forms of the alphabet are known. The following is most commonly used:



Ogham Alphabet.

These seem to have been all the letters of the first O. alphabet. Five characters were afterward added to represent diphthongs:



The sign for the diphthong '*ea*' is said to be the only one which has been observed on ancient monuments. It is added that the sign for '*ui*' sometimes stands for '*y*,' that the sign for '*ia*' sometimes stands for '*p*,' and that the sign for '*ae*' stands also for '*x*,' for '*cc*,' for '*ch*,' for '*ach*,' and for '*uch*.'

O. inscriptions generally begin from the bottom, and are read upward from left to right to the top, when they are carried over, and run down another side or angle. Most of those which have been read give merely a proper name with its patronymic, both in the genitive case. The stones on which Oghams are cut seem mostly to have been sepulchral. Oghams are most frequent in Ireland, where they are found both written on books and inscribed on stones, metals, or bones. The Oghams on stones are most numerous in the counties of Kerry and Cork A few O. inscriptions on stones have been discovered in Wales—as at St. Dogmael's, in Pembrokeshire; near Margam, in Glamorganshire; and near Crickhowel, in Brecknockshire. There are a few in Scotland, as on the Newton Stone and the Logie Stone in Aberdeenshire, on the Golspie Stone in Sutherland, and on the Bressay Stone in Shetland. One has been found in England—at Fardel, in Devonshire. Oghams have been observed on an ancient MS. of Priscian, which belonged to the famous Swiss monastery founded in the 7th c. by the Irish missionary, St. Gall (q.v.).

The difficulties of deciphering O. inscriptions have not been fully overcome. It is confessed by the most learned and judicious of O. scholars. Charles Graves, D.D., of Trinity College, Dublin, that the nature of the character is such that it does not at once appear which, of four differ-

ent ways of reading, is the right one; that the words being written continuously, as in ancient MSS., there is great chance of error in dividing them; and that the Celtic names inscribed are generally Latinized in such a manner as not readily to be recognized.

The old school of Irish antiquaries contended that the Oghams were of Persian or Phœnician origin, and were in use in Ireland long before the introduction of Christianity. But this theory is now generally discarded, as not only unsupported, but as contradicted by facts. A comparison of the O. alphabet, with the alphabets of Persepolis and Carthage, shows that there is no likeness between them. The great majority of O. monuments, it has been observed, bear more or less distinct marks of Christian hands. Several are inscribed with crosses, as old, to all appearance, as the Oghams themselves. Many stand in Christian burying-grounds, or beside Christian cells or oratories. Some still bear the names of primitive saints. At least one is inscribed with a Christian name; and some of the inscriptions show undeniable knowledge of Latin. At the same time, it has been argued by one of the most learned of Celtic philologists, Whitley Stokes, that 'the circumstance that genuine Ogham inscriptions exist both in Ireland and in Wales which present grammatical forms agreeing with those of the Gaulish linguistic monuments, is enough to show that some of the Celts of these islands wrote their language before the 5th c., the time at which Christianity is supposed to have been introduced into Ireland.' It has been observed by Dr. Graves, on the other hand, that there are many points of resemblance between the Oghams of the Celts and the Runes of the Norsemen; and one Irish MS. asserts that the Oghams came to Ireland from Scandinavia. The O. is said to have been in use so recently as the middle of the 17th c., when it was employed in the correspondence between Charles I. and the Earl of Glamorgan.

The best account of Oghams is in papers in *Transactions of the Royal Irish Academy,* by Dr. Graves, now bp. of Limerick, IV. 70, 173, 183, 254; V. 234, 401; VI. 71, 209, 248, where also are papers of value on the same subject by Samuel Fergusson; and the *Catalogue of the Museum of the Royal Irish Academy*, 134–140; and Whitley Stokes's *Three Irish Glossaries,* 55–57, compared with Thomas Innes's *Critical Essay on the Ancient Inhabitants of Scotland,* II. 440–466. See also Astle's *Origin and Progress of Writing,* Petrie's *Essay on the Round Towers of Ireland,* John Stuart's *Sculptured Stones of Scotland,* Ware's *Antiquities of Ireland*, and Brash's *Ogam-inscribed Monuments of the Gaedhil.* O. inscriptions are in the Museum of the Royal Irish Acad. at Dublin, in the Edinburgh Antiquarian Museum, and in the British Museum.

OGILBY, *ō'g'l-bĭ*, John: 1600–1676, Sep. 4: b. Edinburgh. He went to London in early life, and eventually became a dancing-master. Under the patronage of Wentworth, Earl of Strafford, he was appointed master of the revels in Ireland. He built a theatre in Dublin, but was ruined by the civil wars, and afterward returned to Eng-

land and studied at Cambridge. He published various translations in verse including one of Homer which Pope valued highly in his younger days. O. was more than 50 years of age when he took up the study of Greek for the purpose of making this translation, which was very popular, and was noted for typographical beauty. He was also appointed royal cosmographer, and published several vols. of a descriptive geography of the world. He again became master of the revels in Ireland at the restoration, but was ruined by the fire of London.

OGIVE, n. *ō-jīv'* [F.: see OGEE]: among the *French*, a pointed arch crossing another; the Gothic arch with its ribs and cross-springers, etc.

OGLE, n. *ō'gl* [Dut. *oogen*, to eye—from *ooge*, the eye: Ger. *aügeln*, to eye one slyly—from *auge*, an eye]: a side glance or look: V. to view with side glances to attract notice, or in fondness. O'GLING, imp.: N. the act of viewing with side glances. O'GLED, pp. *-gld*. O'GLER, n. *-glėr*, one who ogles.

OGLESBY, *ō'gėls-bĭ*, RICHARD JAMES: b. Oldham co., Ky., 1824, July 25. He removed to Decatur, Ill., 1836; and applied himself to the carpenter's trade, farming and making rope till 1844, studying law in the mean time. He was admitted to the bar and began practice in Sullivan, Ill.; but the next year returned to Decatur, and as 1st. lieut. of the 4th Ill. regt. served in the Mexican war, taking part in the investment of Vera Cruz and the battle of Cerro Gordo. On his return to Decatur 1847, he took a course of study at the Louisville Law School, and graduated 1848. He was employed in California mining 1849–51; and again returning to Decatur was elected to the state senate 1860, but resigned to accept the colonelcy of the 8th Ill. vols. He commanded a brigade at the capture of Forts Henry and Donelson, and for gallant conduct was promoted brig.-gen. of vols., 1862, March 21. A severe wound received at Corinth unfitted him for duty till 1863, April, but he had in the mean time been promoted to maj.gen. of vols., 1862, Nov., and placed in command of the 16th army corps. He resigned 1864, May, was gov. of Ill. 1865–69, and again elected 1872, but was chosen U. S. senator 1873, Jan. He was again gov. of Ill. 1885-89. D. 1899, April 24.

OGLETHORPE, *ō'g'l-thawrp*, JAMES EDWARD: 1696, Dec. 26—1785, July 1; b. London: son of Sir Theophilus O., of Godalming, Surrey. He entered Oxford 1714, but joined the army the same year, serving with distinction as aide-de-camp to Prince Eugene in the campaign against the Turks 1716–7, especially at the siege of Belgrade. He entered parliament as member for Hazlemere 1722, and became deeply interested in improving the condition of poor debtors in English prisons. Aiming not only to liberate the prisoners, but to provide an asylum for insolvent persons and for oppressed Protestants throughout Europe, he conceived the plan of establishing a colony in America between Florida and Carolina. A large sum was raised by subscription, parliament granted £10,000 (about $48,600);

GEN. JAMES OGLETHORPE.

and 1732, June, the king granted to O. and 20 others, the territory between the Savannah and Altamaha rivers. The tract was named Georgia in honor of the king. O. arrived at Charleston with 150 settlers, 1733, Jan., and soon afterward the foundation of Savannah was laid. (For account of O.'s colonial career, see GEORGIA.) He returned to England finally, 1743; and 1745 was appointed maj.gen. and sent against the pretender. His dubious conduct led to his court-martial 1746; but he was acquitted, and 1747 promoted lieut.gen.; he retired as gen. on half-pay 1765. He surrendered his Georgia charter to the British crown 1752, but his interest in colonial affairs was undiminished. When Gen. Gage returned to England 1775, the command of the British troops in America was offered to O., but he declined it unless he were authorized to make concessions. He was a man of more than ordinary culture, and his writings on colonial matters are of local historic value. He died at Cranham Hall, Essex, England.

OGLIO, n. *ō'lĭ-ō:* same as OLIO, which see.

OGOBAI, *ŏg'o-bā*, or OGOWÉ, *ŏg'o-wā:* large river of w. Africa, between the Gaboon and Congo, entering the sea by many mouths, 400 m. n. of the mouth of the Congo, between s. lat. 0° 40′ and 1°20′. Its delta is not less than 1,300 sq. m. in extent, and consists of a most complicated net-work of channels and creeks, with two main branches, the most northerly of which reaches the sea at Nazareth Bay; the other principal mouth, the Bango or Fernand Vaz, about 50 m. farther s., has its outlet at the lagoon of Cama or Ncomi. The researches of Du Chaillu, its first explorer, 1856 and 65; of Walker 1866 and 73; of Compiègne, Marche, and Dr Lenz 1874, and 1875–78 of M. Savorgnan de Brazza and Dr. Ballay, have added to our knowledge of this region. About 60 m. inland, above the head of the delta, the O. flows for about 50 m. from the e., its average width about 2,500 yards. It then bends n. 15 m., and here occurs the junction of the Okanda river, from the n.e., with the Ngunie from the s.: the river is navigable from the sea to this junction. The bed of the main stream, the Okanda, is 800 to 1,000 yards wide above the confluence, with a series of rapids on its upper waters, 180 m. from the sea. In addition to a French commercial establishment on the lower river, there is a British and Hamburg station at Adelina Longa, below the Ngunie. This latter district is distinguished by numerous lakes, one of which, 15 m. long by 7 broad, is connected with the O. by three rivers. Lake Azingo, to the north, is connected with the O. by the river Koli. In 1875 M. de Brazza was at Lopé, and explored the Fan country; he then advanced to Doumé, 50 m. south of the equator, where the course of the river is from s.e. to the n.w. Interrupted by illness, he resumed his explorations 1877, Apr., advancing to the Poubara Falls, in 1 45′ s., where the O. is an insignificant stream. Travelling eastward into unknown country, he crossed the water-parting, and discovered the Alima, a hitherto unknown river, 150 yards wide, flowing e., and in

all probability a tributary of the Congo. The region between the O. and Alima is 50 m. across, and consists of hills of moderate height, with easy passes. The dense forests of the O. are the main haunts of the Gorilla (q.v.), and of several other anthropoid apes, among which are the Nest-building Apes (q.v.). South of the O. dwell the Ashira and Apingi tribes, the latter skilful weavers, though cannibals; between the O. and the Gaboon are the Fans, fully described first by Du Chaillu, who also are cannibals; and have been moving westward for some years, so that the whole Gaboon region is occupied by them. The Fans excel in smith-work, but have deteriorated since their contact with the whites. Next in importance to the Fans are the Bakalai, inhabiting the country around the confluence of the O. and the Ngunié. Among tribes on the upper waters are the Okota, Oseyba (cannibals), and the Okanda. The rise of the O. corresponds with the heaviest rainfall, which is in March and April, and again in Oct. and Nov. Inland, rain is more frequent than at the coast. The O. seems to gather most of its water from lands comparatively near the coast (200–300 m.) and not to depend greatly on more remote tributaries. The remarkable volume of its water is ascribed to its draining an extensive region under the equator where rains are in tropical abundance. Total length of the O. 500 or 600 miles.

OGRE, n. *ō'gėr* [Sp. *ogro;* F. *ogre;* O. Sp. *huergo,* the man-eating giant of fairy tales: It. *orco,* a surname of Pluto, any imaginary monster—from L. *orcus,* hell]: one of the imaginary monsters of nursery stories. OGRESS, *ō'grĕs,* a female ogre; in *her.,* a ball or pellet of a dark color. OGREISH, a. *ō'gėr-ĭsh,* having the supposed character and appearance of an ogre.

OGYGES, *ŏj'ĭ-jēz* or *ō-jī'jēz:* earliest king of Attica and Bœotia named in Greek legend. In his time (according to Larcher, about B.C. 1759, a great flood took place, called the Ogygian Flood, which desolated all the lower districts of both countries, and destroyed their inhabitants. The different legends lead to the supposition that under O. an Egyptian colony came to Bœotia, and thence to Attica. From him Bœotia took the name of Ogygia. OGYGIA, n. *ŏ-jĭj'ĭ-ă* [from *Ogygēs,* anc. Greek monarch whose history and reign are very obscure, hence anything dark or of doubtful origin]: genus of trilobites peculiar to the Llandello flags of the Lower Silurian period. Six species have been described. They were named in allusion to their obscure and remote origin, or from their being found in the earliest fossiliferous formations. OGYGIAN, a. *ŏ-jĭj'ĭ-ăn,* pertaining to Ogyges; term applied to the great deluge in the fabulous history of Greece: applied to anything dark, obscure, or of doubtful origin.

Ogygia Buchii.

OH, int. *ō* [see O]: an exclamation expressive of pain, sorrow, surprise, or dissent.

OHIO, *ō-hī'ō·* state; one of the United States of America; 17th in order of admission into the Union, 4th under the federal constitution; and ranking 1st in Lake Erie fisheries; 2d in petroleum; 3d in dairy products, coal, and value of real and personal property; 4th in population, value of manufactures, and expenditure for public education: 5th in value of mineral products; and 6th in railroad mileage; popularly known as the 'Buckeye state.' The name Ohio is Indian, meaning 'beautiful river.'

Location and Area.—O. is in lat. 38° 23′—41° 58′ n., long. 80° 31′—84° 48′ w.; bounded n. by Mich. and Lake Erie, e. by Penn. and W. Va., s. by W. Va. and Ky., w. by Ind.; extreme length n. to s. 210 m.; extreme breadth 195 m.; Lake Erie water-front 230 m.; Ohio river water-front 436 m.; 41,060 sq. m. (26,278,400 acres); cap. Columbus.

Topography.—Nearly all the state is a table-land or elevated plateau, with average height about 1,000 ft. above sea-level, lowest 433 ft., highest 1,540 ft. The Ohio river, which falls 230 ft. in 436 m., and many of its tributaries, have cut deep valleys in this plateau, exposing steep bluffs and narrow ravines in places. The Lake Erie and Ohio river drainage areas are divided by a ridge extending n.e. to w., from Trumbull co. to Mercer and Darke cos., with average height 600 ft. above the lake. This ridge forms a watershed, from which the surface slopes n. to Lake Erie and s. to the Ohio river. Lake Erie receives the waters of the Maumee, Sandusky, Huron, Vermilion, Portage, Black, Cuyahoga, Rocky, Chagrin, Grand, Conneaut, and Ashtabula rivers; and the Ohio river those of the Mahoning, Muskingum, Scioto, Little Miami, Great Miami, Walhonding and Tuscarawas (forming the Muskingum), and the Whetstone (chief affluent of the Scioto) rivers. The Ohio river is navigable for light-draught vessels to Pittsburg, Penn.; and the Muskingum, by means of slack-water improvements, from its mouth to Dresden, 95 m. The other rivers are commercially non-navigable. The Maumee river has long been noted as one of the best fish-producing streams in America. There are good harbors at Cleveland, Sandusky, and Maumee Bay; besides lake ports at Toledo, Conneaut, Ashtabula, Black River, Fairport, Port Clinton, Vermilion, Put-in-Bay, and Huron.

Climate.—The climate, in general, is healthful; in the n. portion the winters are cold, with abundant and long-lying snow, and summers and autumns are temperate and pleasant; in the s. portion the winters are short, mild, and with little snow, and the summers are long and hot; average mean temperature n., at Cleveland, 45° 87′, and s., at Portsmouth, 55° 83′; mean annual rainfall, Cleveland 38·43 in., Portsmouth 38·32. The changes in temperature are frequent and extreme, but the constantly varying winds greatly lessen the duration of the extremes. The annual mean temperature of the whole state is 50·1°; and mean precipitation 39·35 inches.

OHIO.

Geology.—Nearly all the formations are secondary, and include limestone, lias, saliferous and ferriferous rocks, sandstone, and gray wacke, all in horizontal strata. The oldest rock in the state is the Cincinnati limestone, of Lower Silurian age, and allied to the Trenton and Hudson groups of N. Y. It extends from the Wine Islands, in Lake Erie, into Ky., where it underlies the blue-grass region, and into Tenn.; and is composed of limestone, marl, and clay, with great variety of fossil remains. Near the Cincinnati limestone are the Clinton and Niagara limestones, the former yielding iron ores in Muskingum co., and the latter excellent lime. The Salina group, prominent at Syracuse, N. Y., is exposed at Sandusky, and bears gypsum and fine building-stones. The water-lime, developed on the Wine Islands and in the w. part of the state, supports the Oriskany sandstone. There are two belts of carniferous limestone—one extending from Sandusky into Pickaway co., the other from Toledo to Van Wert, near the Ind. line; and this limestone forms the surface-rock of Kelley's Island (q.v.). This formation yields excellent building-stone, such as the state-house was constructed with, besides lime and remains of large ganoid fishes; and is quarried at Kelley's Island, Columbus, Sandusky, Delaware, and elsewhere. Huron shale is found in the n.w. part of the state, and in a belt averaging 15 m. wide from Lake Erie to the Ohio river, and is the source of the petroleum and natural gas of Penn. and parts of O. Erie shale borders the lake-shore from Penn. to the Vermilion river. The carboniferous system underlies nearly the e. half of the state, and rests on the shales and sandstones of the Waverley group, with the Berea grit for a substratum. The latter sandstone is quarried at Amherst, Berea, Buena Vista, and Independence, for grindstones and building-purposes. The coal measures, showing strata of shale, sandstone, limestone, coal, fire-clay, and iron ores, occupy the s.e. third of the state, underlie 20 cos., cover 12,000 sq. m., have a maximum thickness of 1,200 ft., and are divided into the lower (400 ft.), barren (400 ft.), and upper (300–600 ft.) measures. The lower measure contains block coal, and the upper measure 9 seams of Strawbridge cannel, cannel, Leetonia coke, and coking coals, while the barren measure contains 3 seams of only local importance. An area of nearly 12,000 m. in the s. part of the state contains the second great mineral staple, iron, representing the ores of the buhrstone stratum of the lower coal measures, considered the most important spathic ores in the United States, the black band of the barren measures, and its subordinates, mountain and kidney. Drift deposits cover nearly two-thirds of the state, and contain clay, sand, gravel, and large bowlders.

The economic properties of O. are coal, wholly in Mahoning, Columbiana, Stark, Holmes, Tuscarawas, Carroll, Jefferson, Harrison, Belmont, Guernsey, Coshocton, Muskingum, Perry, Noble, Morgan, Monroe, Washing-

Area in Square Miles, 41,060. Population, 4,157,545.
Number of Counties, 88. Capital of State, Columbus.
OHIO
SCALE OF MILES
0 10 20 30 40 50 60
Longitude West 83° from Greenwich
MICHIGAN
LAKE ERIE
ONTARIO
PENNSYLVANIA
WEST VIRGINIA
KENTUCKY
Lake St. Clair
Ohio R.
Big Sandy R.
LANSING
Port Huron
Sarnia
London
Jackson
Ann Harbor
Detroit
Sandwich
Chatham
Rondeau
Hudson
Monroe
Toledo
W. Toledo
Cleveland
Sandusky
Huron
Vermilion
Lorain
Elyria
Oberlin
Wellington
Medina
Akron
Canton
Massillon
Alliance
Youngstown
Ashtabula
Conneaut
Kingsville
Painesville
Mentor
Willoughby
Nettingham
Collinwood
E. Cleveland
Madison
Perry
Austinburg
Jefferson
Rock Creek
Andover
E. Orwell
Bedford
Chardon
Burton Sta.
Middlefield
Chagrin Falls
Hiram Sta.
Garrettsville
Cortland
Warren
Niles
Girard
Hudson
Ravenna
Tallmadge
Cuyahoga Falls
Newton Falls
Deerfield
Alliance
Barberton
Doyles-town
N. Berlin
Sebring
Salem
Washingtonville
Columbiana
New Lisbon
Leetonia
Strattonville
Lowellville
Fulton-town
Louisville
Navarre
Malvern
Minerva
Waynesburg
E. Liverpool
Carrollton
Saline Iron Works
Cadiz
Smithfield
Steubenville
Mingo
Bellaire
Martin's Ferry
Bridgeport
Wheeling
Fairmont
Clarksburg
Parkersburg
Belpre
Marietta
Zaleski
Athens
Jacksonville
Nelsonville
Logan
Hocking
Glouster
Chester Hill
Stanleyville
Summerfield
Woodsfield
Hannibal
Graysville
New Matamoras
Warner
Beverly
McConnelsville
Rendville
New Lexington
Crooksville
Roseville
Somerset
Philo
Caldwell
Zanesville
Pleasant City
Buffalo
Senecaville
Quaker City
Barnesville
Beallsville
Clarington
Lone City
Flushing
St. Clairsville
Dridgeport
Cambridge
Concord
Newark
Granville
Hebron
Pataskala
Milo
Pickerington
Baltimore
Pleasantville
Groveport
Canal Winchester
Lancaster
Ashville
Bremen
Amanda
New Shawnee
Circleville
Straitsville
Kingston
Laurelville
Murray
Trimble
Fleming
South Bloomingville
Chillicothe
Greenfield
McArthur
Byer
Albany
Dyesville
Dexter
Langsville
Pomeroy
Minersville
Syracuse
Middleport
Addison
Gallia
Gallipolis
Wheelersburg
Portsmouth
Manchester
Buenavista
Ironton
Hanging Rock
Portsellsville
Oakhill
Bidwell
Lucasville
Waverly
Coalton
Jackson
Piketon
Wellston
Alice
Taylorsville
Locust Grove
Sardinia
Wilson
Rarden
Bainbridge
Hillsboro
Lynchburg
Milford
Washington
Batavia
Mowrystown
Williamsburg
Amelia
New Richmond
Bethel
Winchester
Henley
S. Webster
Georgetown
Felicity
Ripley
Aberdeen
Union
Williamstown
Maysville
Flemingsburg
Carlisle
Grayston
Coalgrove
Proctorville
Kenova
CHARLESTON
Georgetown
Lexington
Paris
Mt. Sterling
Morehead
Winchester
Springfield
COLUMBUS
Dayton
Cedarville
Xenia
Jefferson-ville
Mt. Sterling
Yellow Spr.
London
S. Charleston
Grove City
Milton
Carlisle
Arcanum
Madison
New Paris
Eaton
Alexandria
Carrollton
German-town
Camden
Middletown
Oxford
Hamilton
Lebanon
Morrow
Wilmington
Clarksville
Mason
Lovelandville
Loveland
Blanchester
Pleasant Ridge
Oakland
Glendale
Harrison
Addyston
Home City
Cincinnati
Covington
Versailles
Minster
Sidney
Piqua
Troy
Tippecanoe City
Urbana
Mechanics-burg
Plain City
Milford Cen.
Mar-ysville
N. Lewisburg
St. Paris
Jackson Cen.
Liberty
Degraff
Quincy
Bellefontaine
Lakeview
Rushsylvania
Prospect
Maysfield
Richwood
Peoral
Delaware
N. Dover
Johnstown
Wester-ville
Granville
Frazeysburg
Dresden
Roscoe
Warsaw
Coshocton
Cambridge
W. Lafayette
Freeport
Kimbolton
Mt. Pleasant
Flushing
St. Clairsville
Dridgeport
Barnesville
Quaker City
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Smithfield
Steubenville
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Bellaire
Martin's Ferry
Bridgeport
Wheeling
Fairmont
Clarksburg
Parkersburg
Belpre
Marietta
Zaleski
Athens
Jacksonville
Nelsonville
Logan
Hocking
Glouster
Chester Hill
Stanleyville
Summerfield
Woodsfield
Hannibal
Graysville
New Matamoras
Warner
Beverly
McConnelsville
Rendville
New Lexington
Crooksville
Roseville
Somerset
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Laurelville
Murray
Trimble
Fleming
South Bloomingville
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Dyesville
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Langsville
Pomeroy
Minersville
Syracuse
Middleport
Addison
Gallia
Gallipolis
Wheelersburg
Portsmouth
Manchester
Buenavista
Ironton
Hanging Rock
Portsellsville
Oakhill
Bidwell
Lucasville
Waverly
Coalton
Jackson
Piketon
Wellston
Alice
Taylorsville
Locust Grove
Sardinia
Wilson
Rarden
Bainbridge
Hillsboro
Lynchburg
Milford
Washington
Batavia
Mowrystown
Williamsburg
Amelia
New Richmond
Bethel
Winchester
Henley
S. Webster
Georgetown
Felicity
Ripley
Aberdeen
Union
Williamstown
Maysville
Flemingsburg
Carlisle
Grayston
Coalgrove
Proctorville
Kenova
CHARLESTON
Georgetown
Lexington
Paris
Mt. Sterling
Morehead
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Springfield
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Dayton
Cedarville
Xenia
Jefferson-ville
Mt. Sterling
Yellow Spr.
London
S. Charleston
Grove City
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Carlisle
Arcanum
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New Paris
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Carrollton
German-town
Camden
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Wilmington
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Lovelandville
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Oakland
Glendale
Harrison
Addyston
Home City
Cincinnati
Covington
Versailles
Minster
Sidney
Piqua
Troy
Tippecanoe City
Urbana
Mechanics-burg
Plain City
Milford Cen.
Mar-ysville
N. Lewisburg
St. Paris
Jackson Cen.
Liberty
Degraff
Quincy
Bellefontaine
Lakeview
Rushsylvania
Prospect
Maysfield
Richwood
Peoral
Delaware
N. Dover
Johnstown
Wester-ville
Granville
Frazeysburg
Dresden
Roscoe
Warsaw
Coshocton
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Proctorville
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Lexington
Paris
Mt. Sterling
Morehead
Winchester

ton, Athens, Meigs, Gallia, and Lawrence, and partly in Jackson, Trumbull, Portage, Geauga, Summit, Medina, Licking, Wayne, Hocking, Fairfield, Scioto, Vinton, Knox, Richland, and Ashland cos.; iron in Lawrence, Gallia, Jackson, Meigs, Vinton, Athens, Hocking, Perry, and Licking cos.; white limestone in Montgomery and adjacent cos.; petroleum in Trumbull, Lorain, Medina, and Noble cos.; hydraulic cement in Belmont, Lucas, and Auglaize cos.; the limestones and sandstones above mentioned; salt; mineral springs; and marl.

Zoology.—Nearly all the wild animals of the earlier time, deer, wolf, bear, raccoon, and fox, have become extinct; game-birds are abundant in season; the song-birds and birds of prey common to N. Y. and Penn. are found here also; numerous reptiles, similar to those in the Mississippi valley, are encountered; and small game is still hunted in various parts. The waters of the state are especially rich in fish. The chief rivers are stocked with trout, black bass, perch, roach, and many other fresh-water fish; and Lake Erie is prolific in the delicious lake whitefish and salmon. The principal fishing-ports are Sandusky, Toledo, Cleveland, Huron, Conneaut, Put-in-Bay, and Ashtabula; and much attention is given to the manufacture of caviare and smoked sturgeon.

Agriculture.—The greater part of the soil is arable, more than nine-tenths of it being in the farm acreage. The 'Western Reserve,' in the n.e., is adapted particularly to dairying and stock-raising; the s.e. part to wool-growing; the bottom-lands of the Scioto, Miami, and Muskingum rivers to Indian corn; the Muskingum and Maumee valleys to wheat; the islands and shores of Lake Erie to viniculture; and the 'Western Reserve' and Miami valley to apples. The forests contain evergreens, pines, hemlock, tamarack, cypress, spruce, 8 varieties of oak, 3 varieties of ash, 4 varieties of maple, 4 varieties of elm, sycamore, cottonwood, 5 varieties of thorn, dogwood, ironwood, black walnut, 5 varieties of poplar, honey locust, box elder, red and black cherry, mulberries, redbud, and Ky. coffee-tree. The indigenous medicinal plants include ginseng, gentian, valerian, mandrake, cohosh, blood and snake roots, and calumba.

The principal crops are corn, wheat, oats, rye, potatoes, tobacco, and hay, their total annual value being in round numbers $145,000,000. The live stock in the State is estimated to be worth about $160,000,000. The area of waste land in the state has been reduced to a minimum. The large number of manufacturing towns and cities, making a ready market for all farm and dairy products produced in the state, has greatly influenced the agricultural development of O., and has at the same time been one of the chief causes underlying the increase of

improved land acreage from decade to decade since 1850. The average size of the farm in 1890 was 125.2 acres; the average size in 1910, 88.5 acres; and the average size 10 years after that, at the time of the last census, something under 75 acres. The number of farms occupied and operated by tenants is approximately 25 per cent. There are almost twice as many farms leased on shares as are rented for cash. Fertilizers are in general and constantly increasing use. The agricultural products are varied, seeming to grow well in all parts of the state. The clay soil of the northeast is particularly adapted to wheat, which ranks second among the state's crops in point of acreage, although wheat is also cultivated extensively in other sections. Among the vegetables which O. produces in abundance, cabbage, sweet corn, and tomatoes are particularly notable. The state is also noted for its extensive orchards, apples, peaches, pears, plums and prunes being very valuable. Large vineyards are located in the region near Lake Erie, while small fruits are cultivated in all parts of the state.

Manufactures.—There are altogether more than 35,000 manufacturing establishments in the State, having an aggregate annual output of very nearly $1,000,000,000. According to the latest reports, O. ranked first in the U. S. in the manufacture of carriages, wagons, and supplemental materials, and in pottery and clay products; it was second in the manufacture of agricultural implements of iron and steel, and of food preparations; third in flouring and grist mills products, in the roasting and grinding of coffee and spices, in foundry and machine shop products, distilled liquors, soap and candles, and tobacco, cigars, and cigarettes; fourth in the factory product of boots and shoes, of women's clothing, in the manufacture of glass, of rubber and elastic goods, in refining petroleum, and in cars and general shop construction and repairs by steam railroad companies; and fifth in the factory product of men's clothing, electrical apparatus and supplies, malt liquors, lumber and planing mill products, including sashes, doors, and blinds, in book and job printing and publishing, and in the printing and publishing of newspapers and periodicals. In the value of all manufactures, O. ranked fourth among the U. S. from 1840 to 1880, but in the latter year was surpassed by Illinois, and became fifth, holding that rank ever since. Cleveland and Cincinnati are the chief industrial centres. Cincinnati long held the lead, but has apparently attained its maximum, while Cleveland is still increasing. From 1800 to 1850 Cincinnati was the centre of an extensive hog raising region, and during that period was the most important meat-packing city in the U. S.; the manufacture of tobacco is also a leading industry of Cincinnati. The manufacture of foundry and machine shop products, including engines, boilers, and machinery of many varieties, is carried on

extensively in all the leading cities of the state, but chiefly at Cleveland and Cincinnati. Youngstown, in the Mahoning Valley, is the leading city in the state in the iron and steel industry. Mining machinery is made at Columbus and Akron, machine tools at Hamilton. Pottery is produced at Cincinnati, Akron, Zanesville, Roseville, and East Liverpool, the last town manufacturing over 49 per cent. of the white granite ware and semi-vitreous porcelain of the U. S. Toledo is one of the granaries of the country with important flouring and grist mills, and Springfield and Canton lead in the manufacture of agricultural implements. The manufacturing importance of the state is due to its ample natural resources as detailed under *Minerals and Mining*, and *Forests*, and their accessibility by waterways and rail, which led to an early introduction of domestic manufactures along with the chartering of a trading and banking company in 1803.

Minerals and Mining.—It has been estimated that at the present rate of consumption the state has bituminous coal enough to last 1,000 years. Fire clay of a superior quality forms the interbedding strata of the coal measures. Building stone and the carbonate variety of iron ore are also found here. The salt and gypsum deposits near Sandusky have already been mentioned. Petroleum was discovered in 1884 in the Trenton limestone formation of the Lower Silurian period, and both the Lower and Upper Silurian formations had reservoirs of gas. The coal output of the state amounts, on a general average, to 20,000,000 tons, 7 per cent. of the total output of the U. S. The number of employees engaged in the coal industry of the state, in 1910, was about 30,000. The petroleum industry since 1885, has been most important. There are two distinct petroleum districts:—one, the Lima district, in the n.w., is the more important,—the other, called the Eastern district, is in the s.e. Lubricating oil is obtained in what is called the Mecca-Belden district. There are two gas fields in the state; that in the Eastern district was the first developed in the 70s. The gas was used wastefully and in a few years the supply was almost exhausted. In 1880 the natural gas of the Eastern district used for light and fuel was valued at $5,000,000; in 1885 the value of the product consumed from the same district was $100,000. About 1885 the gas field near Findlay, in the n.w., began to attract attention. Until 1889 the output of the n.w. increased annually; then it began to decrease gradually until 1898, since when the annual output has increased. The value of the natural gas product of the Findlay district is now about $3,000,000.

The annual value of the clay products of O. is greater than for any other state in the Union, being about $20,000,000, while the value of sandstone products is very nearly $3,000,000.

The annual value of the clay products of O. is greater than for any other state in the Union; in 1900 the state

The state supplies over three-fourths of all the grindstones and whetstones used in the country. Though the mining of iron ore is not as important an industry as in former years; O. still ranks high in the value of carbonated iron ore. Limestone is an important product of O., and large quantities of cement are manufactured each year. There are a number of mineral springs in the state, and the state is ranked fourth in the production of salt.

Forests.—The total extent of forests in O. is about 9,000 sq. m., and the wood products of the State were particularly noted for their good quality when the raw material was obtained from native forests. Excellent woods were found in abundance.

Commerce and Transportation.—The foreign commerce of the State, carried on through Cleveland, Cincinnati, Toledo, and Sandusky, the four ports of entry of the U. S. customs districts of the region, is practically unimportant, compared with the enormous domestic over the waterways and railways of the State. The O. river, forming the southern boundary of the State for 436 m., and its tributary to the Muskingum river, navigable for several m. above Zanesville, have formed for over a century one of the greatest highways of internal commerce, affording cheap communication with western Pennsylvania and the entire Mississippi valley; notwithstanding the advent and competition of railroads, their waters still bear the larger freight of coal, lumber, and the heavier articles of transport. Two canals originally connected Lake Erie with the O. river, one from Cleveland to Portsmouth, and the other from Toledo to Cincinnati; but at the present time there is no connection with the lake and river by either, owing to abomination and decay. Lake Erie and the Erie canal afford water communication with the Atlantic seaboard; and the northwest states are reached via the western Great Lakes and the Sault Sainte Marie canal.

The railroad construction of the State dates from 1832, development having been steady until there are at present including main line, second line, branches, and side tracks, over 14,000 miles of track in the State. Among the great lines traversing the State are the Baltimore and O., the Lake Shore and Michigan, the Pennsylvania, the Erie, etc. O. is also provided with

a network of interurban electric railroads, connecting every populous centre in the State, and ranking among the foremost States in the Union in the extent of its electric road mileage.

Finance and Banking.—The total assessed valuation of property, including both personal and realty, is $2,352,680,824, the tax rate $1.35 per $1,000, and the bonded debt $1,655,000. There are about 400 State banks and trust companies, over 350 private banks, and even more national banks. The first bank was a private institution, but before the close of 1813 five banks had been established, all by special act of the legislature. The first governmental bank in the state was established in Cincinnati in 1817. The innovation, as it was called, met with great opposition and various methods were suggested whereby the United States bank might be suppressed or induced to leave the state. From 1817 to 1836 there were 25 banks established. In 1836 an effort was made to found a second U. S. Bank, but the legislature passed a special act prohibiting its establishment. A number of private and unauthorized banks were established between 1840 and 1850. The failure of several of these caused losses to many people, and led to the passage of prohibitory laws regarding the establishment of unauthorized banks by the legislature of 1845. This law proved ineffective, and so a free banking law was passed in 1851. So much had public opinion changed that in 1863 nearly all the state banks became national banks. In the panic years of 1873, 1884 and 1893 there were many failures in the state, nearly all of which were confined to private and state banks. In 1900 the high prices of U. S. Bonds and other reasons caused a reaction in favor of state banks, and their rapid growth dates from that time.

Education.—The State spends almost $21,000,000 a year in the maintenance of its public schools, in which there are about 850,000 pupils enrolled, with over 27,000 teachers. There are State normal schools in connection with the O. University and the Miami University, besides private secondary schools, academies, colleges and universities, and schools of technology, theology, medicine, and law. There are also a great number of denominational schools, conducted for the most part by the Roman Catholic and Lutheran Churches, as well as schools of dentistry and pharmacy.

Charities and Corrections.—A National Soldiers' Home is located at Dayton. This has accommodations for about 6,000 persons. The Roman Catholic charitable institutions, which are in a very flourishing condition in the state, include about 15 orphan asylums, having over 2,000 inmates; 3 industrial schools, with nearly 500 inmates; about 20 hospitals, with well over 12,000 patients each year; 4 homes for the aged, with about 500 inmates each year; and three homes for the friendless, with about 200 inmates each year. The expenses of the institutions of a state, municipal and county nature aggregate considerably more than $5,000,000.

Charitable and Penal Institutions.—The State Board of Charities consists of seven members; six of whom are appointed by the governor, the governor of the state is *ex-officio* a member and is president of the board. A secretary is appointed by the board. The board has the supervision of all state and municipal institutions, including infirmaries, jails and orphanages, or all institutions for furnishing relief or for correction. The state law further provides that this board shall examine, for criticism or approval, all plans for charitable or penal institutional buildings, or changes in buildings. There are 17 state institutions, as follows: State hospitals at Athens, Cleveland, Columbus, Dayton, Longview, Toledo; the Ohio Hospital for Epileptics, Institution for Deaf and Dumb; State School for the Blind, Industrial Home for Girls; Industrial School for Boys; homes at Xenia and Sandusky; a state penitentiary and a state reformatory. The municipal institutions are workshops at Canton, Cincinnati, Cleveland, Columbus, Dayton, Toledo, Xenia, and Zanesville, and a House of Refuge at Cincinnati. The county institutions are infirmaries, homes, and jails. Outdoor relief is given by infirmary doctors, township clerks, and under the direct supervision of the Soldiers' Relief Commission. Changes will be made in the care of epileptics, who are now (1903) in a hospital at Gallipolis. The Juvenile Court, at Cleveland, has shown there are great opportunities for the prevention of the crimes often committed by the young and how they may be reclaimed. The annual State Conference has been productive of much good. Each county has a board of county visitors.

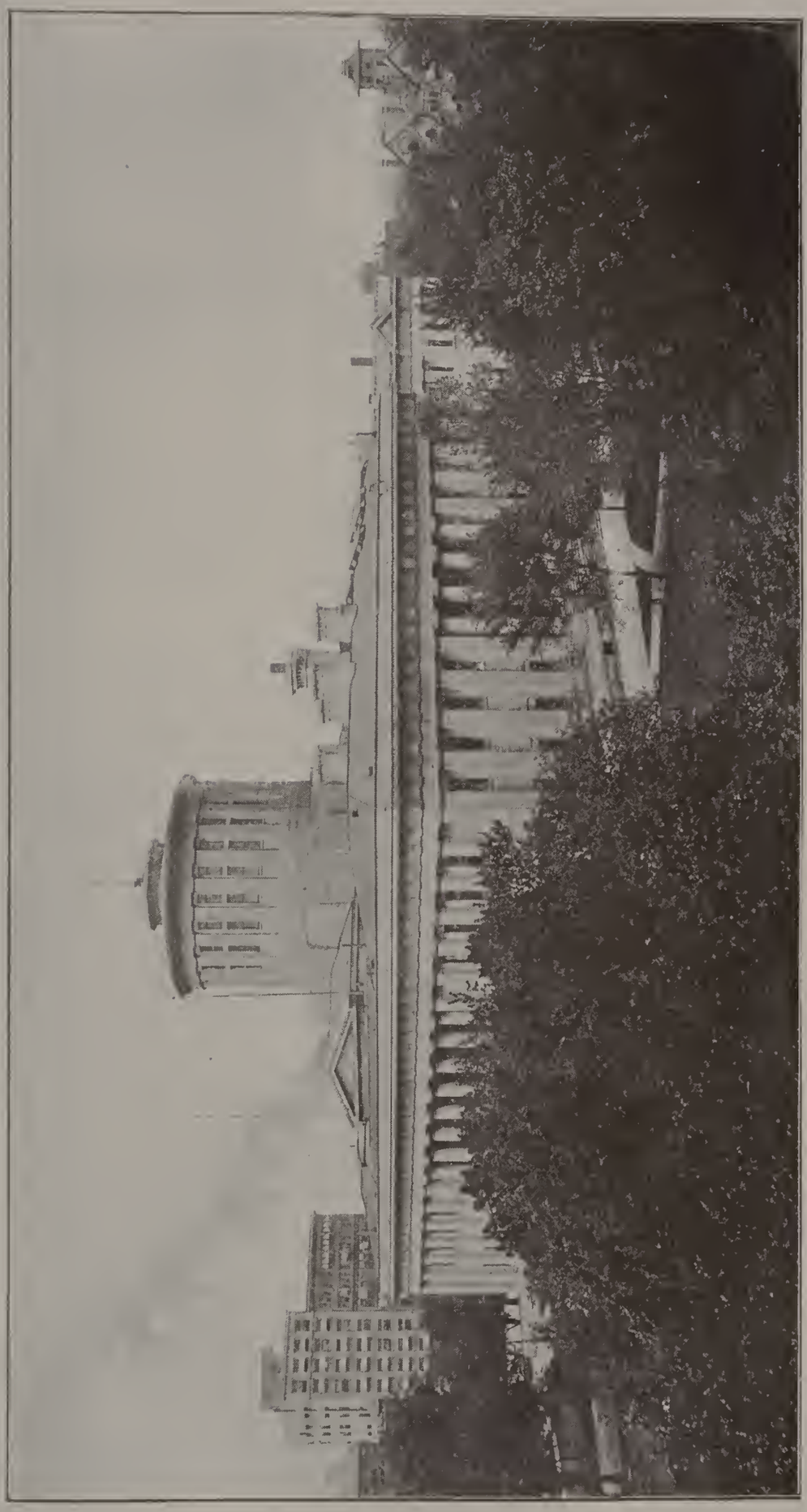
State Militia.—The official designation of the organized militia in the State is the Ohio National Guard. According to the latest reports the number of generals and general staff officers totaled 87; the regimental and company officers, 430; the enlisted men, 5,776. This brought the total for both enlisted and commissioned men to 6,293, while the unorganized reserve militia numbered 1,085,110.

Religion.—The Methodist is the strongest denomination in the State, with the Roman Catholic second. Other denominations, which are represented in particularly strong numbers, are the Lutheran, Baptist, Disciples of Christ, Congregationalists, and Protestant Episcopalians.

Constitution.—The present (1904) State Constitution was adopted in 1851, and is the second one under which O. has been governed (see *History*). Provisions for a constitutional convention are arranged for in two ways. 'Shall there be a constitutional convention?' is a question submitted to the people at a popular election each twentieth year, and a majority vote in the affirmative is followed by the proposed convention. A constitutional convention may be called at any time if two-thirds of the members of each branch of the legislature demand it, and if a majority of all the legal votes cast at a popular election favor it. Amendments may be added as follows: The amendment may originate in either branch of the legislature; it must be approved by three-fifths of the members of each House and by a majority of the electors voting at a popular election. If there are several amendments, each one must be voted upon separately. The right to vote implies citizenship, residence in the state for one year, in the county, township, or voting district such a time as may be determined by the general law for the state. Further limitations take into consideration sex, age, and sanity. The right of suffrage may be withdrawn from any person, by the legislature, for certain causes, as bribery, perjury, and other crimes. Voters are obliged to register as required by law, in cities of 9,000 population or over. The state sends to congress 21 members. The government of the state is administered by the legislature, the executive, and the judicial departments.

History.—The territory and vicinity of the present state of O. were inhabited at one time by tribes of Indians who exhibited in their mounds and fortifications a higher state of intelligence than did almost any other tribe of which memorials or definite information has been preserved. The mounds that they erected in the valley of the Scioto river attracted the attention of the American archæologists, Ephraim George Squier and Edwin Hamilton Davis, M.D., and their work 1836–47 was greatly encouraged by Daniel Webster, who regretted the rapid disappearance of these antiquities. Nearly 100 groups of earthworks were surveyed and about 200 mounds were opened at the expense of Squier and Davis, the results forming the largest collection of mound relics ever made in the United States. Had Webster's suggestion been adopted, that a society be formed to purchase and preserve what he believed to be the most remarkable works of the mound-builders, this unique collection would never have been permitted to leave the

country and become a distinct feature of the Blackmore Museum in Salisbury, England. A subsequent collection is preserved in the American Museum of Natural History in Central Park, New York. An account of the first explorations, prepared by Squier, forms the first vol. of the *Smithsonian Contributions to Knowledge* (1848), under the title, *Ancient Monuments of the Mississippi Valley*. It is believed that the Indians who built these mounds were succeeded by other and entirely distinct tribes, resembling in many essentials the contemporary Indians in N. Y. and Penn., and that it was this second family that La Salle met 1680, when he made the first white man's exploration on record in this region. His party established numerous trading-posts through the O. valley; and though there is no evidence to indicate that they then attempted any permanent settlements, the French govt. claimed possession of the region because of the nationality of the explorers. Counter-claims were made by the English, based on cessions by James I. to Va. (1611), of all the present territory of O. s. of lat. 41° n., and by Charles II. to Conn. (1662), of all the territory north of that line. Under these claims, surveyors were sent out, posts for trade with the Indians were established, and a number of settlements were planted. Jealousies between the French and English soon sprang up; the French commandant at Detroit warned all English settlers to retire from the region n. of the Ohio river 1749; the English failed to dislodge the French in the war 1755; and the French held possession till the treaty of Paris 1763 gave to Great Britain all the territory held or claimed by France in the n. and w., as far as the Mississippi river. After the close of the revolutionary war, this whole territory was claimed in parcels by Va., Conn. (quoting the above cessions), Mass., and N. Y.; and the disputes were settled (1800) by each claimant ceding to the federal govt. its alleged rights in the great tract, excepting that Va. and Conn. reserved the ownership of about 3,700,000 acres each, the tract of Va. including the region of the falls of the Ohio, and now forming part of Ind., and that of Conn. becoming known as the 'Western Reserve.' In 1788, Apr., a colony from New England founded Marietta, and, in Dec. following, a settlement was made on the site of Cincinnati. Indian depredations retarded the development of the territory 1792–99. In the latter year the federal govt. organized the whole region as the Northwest Terr.; 1800, May 7, the terr. of O. was organized; 1802, Nov. 29, the first state constitution was adopted; and 1803, Feb. 19, the state was admitted to the Union. The state capital was Chillicothe 1800–10, Zanesville 1810–12, Chillicothe 1812–16, and Columbus since. The first constitution was in force till 1851, when an amended one was ratified; and this is still the law of the state, a new constitution framed 1873 being rejected



STATE CAPITOL AT COLUMBUS.

by the people 1874. The movement 1821 for internal improvements, which resulted in the construction of the state canals and the early railroads, made the state accessible from all important points, and marked the real beginning of its prosperity. Geological surveys were made 1837–8, 1869, and 1874. During the war with England 1812–14, O. was concerned in Com. Perry's great victory over the British at Put-in-Bay, Lake Erie; and during the civil war the state was twice raided by the Confederates, and it furnished 313,180 men for the Union armies.

Government.— The executive authority is vested by the constitution (1851) in a gov., elected for two years, salary $8,000 per annum; lieut. gov., elected at the same time and for the same term; sec. of state; treas.; atty.-gen.; auditor; adjt.-gen.; commissioner of common schools; supt. of insurance; sec. of agriculture; and commissioner of labor statistics—all but the auditor (four years) and school commissioner (three years) being elected for two years. The gov. has a very limited power of appointment, and no veto power. The lieut. gov. is *ex officio* pres. of the senate, has a casting vote only, and succeeds the gov. in case of the death, resignation, impeachment, or other disability of the latter. All vacancies in offices below that of lieut.gov. may be filled by appointment by the gov., till the next general election. The legislative authority is a general assembly, consisting of a senate of 37 members and a house of representatives of 112 members, each elected for two years, salary $600 per annum and 12 cts. milage. The constitution empowers the gov., auditor and sec. of state to redistrict the state every 10 years. The assembly cannot grant special charters to corporations, but may provide for their creation by general laws. The constitution provides for biennial sessions; but adjourned sessions have been held in recent years, which made the meetings practically annual. In the election 1889, an amendment was adopted fixing the sessions as formerly provided. The judicial authority is vested in a supreme court of 6 judges, elected for six years, so classified that the term of one expires each year; a dist. court of one judge of the supreme court and the judges of the court of common pleas for the dist. in which the court is held; a court of common pleas originally composed of 3 judges, elected for 5 years, in each of the 10 districts into which the state is divided; a probate court of one judge, elected for 3 years, in each county; superior courts established under constitutional authority in certain large cities; local police courts; and justices of the peace. The common law of England is the basis of the civil law in the state, the criminal law is wholly statutory, there are no offenses recognized as common-law offenses, and there is no formal distinction between actions at law and in equity.

OHIO.

The successive govs., with their terms of service, are as follows:

Territory.

Arthur St. Clair....(1788–1802)C. W. Byrd (acting)...(1802–03)

State.

Edward Tiffin	1803–07	Salmon P. Chase	1856–60
Thomas Kirker(acting)	1807–08	William Dennison	1869–62
Samuel Huntington	1808–10	David Tod	1862–64
Return J. Meigs	1810–14	John Brough	1864–65
Othniel Looker (acting)	1814	C. Anderson (acting)	1865–66
Thomas Worthington	1814–18	Jacob D. Cox	1866–68
Ethan Allen Brown	1818–22	Rutherford B. Hayes	1868–72
Allen Trimble(acting)	1822	Edward F. Noyes	1872–74
Jeremiah Morrow	1822–26	William Allen	1874–76
Allen Trimble	1826–30	Rutherford B. Hayes	1876–77
Duncan McArthur	1830–32	Thomas L. Young	1877–78
Robert Lucas	1832–36	Richard M. Bishop	1878–80
Joseph Vance	1836–38	Charles Foster	1880–84
Wilson Shannon	1838–40	George Hoadley	1884–86
Thomas Corwin	1840–42	Joseph B. Foraker	1886–90
Wilson Shannon	1842–44	James E. Campbell	1890–92
T. W. Bartley(acting)	1844	Wm. McKinley	1892–96
Mordecai Bartley	1844–46	Asa S. Bushnell	1896–1900
William Bebb	1846–49	George K. Nash	1900–04
Seabury Ford	1849–50	Myron T Herrick	1904–06
Reuben Wood	1850–53	John M. Pattison	1906–07
William Medill	1853–56	Andrew L. Harris	1907–09
		Judson Harmon	1909–

Political Divisions.—There are 88 counties in the state. The federal census of 1900 gave the population of the nine largest cities as follows: Cleveland, 560,663; Cincinnati, 363,591; Toledo, 168,497; Columbus, 181,511; Dayton, 116,577; Youngstown, 79,066; Akron, 69,067; Springfield, 46,921; Canton, 50,217; Columbus is the capital of the state.

Local Government.—The legislature provides by law, for the organization and powers of cities and incorporated villages, and for the election of county and township officials. The terms of office of county officers do not exceed three years.

Laws.—The legal rate of interest is 6 per cent., but 8 per cent. may be obtained by contract. Pure-food laws have been passed and are rigidly enforced. Divorces may be obtained for several causes:—wilful absence for three years, extreme cruelty, habitual drunkenness, imprisonment in the penitentiary, adultery, divorce procured by either party in another state, are the chief causes. Restrictions as to time of residence in the state are enforced.

Politics.—State and congressional elections are held on Tuesday after the first Monday in Nov. Every male citizen of the U. S., 21 years of age, who has resided in the state one year, and in the county, township, or ward such period as may be fixed by law, next preceding election, is entitled to vote; and idiots, insane, and unpardoned felons are excluded from voting. The state govt. (1906) was republican in all state and judicial offices. O. has 23 electoral votes. For presidential vote, see PRESIDENT AND VICE-PRESIDENT, ELECTIONS OF.

OHIO.

Population.—(1800) 45,365; (1860) 2,339,511; (1900) 4,157,542; (1910) 4,767,121.

OHI'O River: large stream, flowing from the Allegheny Mountains to the Mississippi river. It was discovered by La Salle and his followers in their exploring expedition 1669, and probably received from them the name *La belle rivière*—the beautiful river—by which it was afterward called by the French settlers. They floated down the river in canoes as far as the falls at the present site of Louisville, but returned north without determining whether the stream finally found its way to the Pacific Ocean, as they thought was probable, or was turned from its westward course and continued to the Gulf of Mexico. The river is formed by the Allegheny and Monongahela rivers, which unite at Pittsburg. It pursues a winding w.s.w. course till it reaches Cairo, Ill., where it empties into the Mississippi, a distance of only 615 m. in a straight line, but of 975 m. by its circuitous route. The Allegheny, with a course of between 300 and 400 m., is the upper stream of the O., and should be included in the measurement, making the total length of the stream about 1,300 m. Though not the longest of the tributaries to the Mississippi, it discharges the greatest volume of water. The Monongahela rises in W. Va. and flows n. nearly 300 m. The Allegheny rises in Potter co., in the n. part of Penn., in the elevated region which turns part of its waters to the St. Lawrence and part to the Gulf of Mexico, and after passing into N. Y., returns to Penn. and after many deviations reaches the point of junction with the Monongahela. The main Ohio river drains an area variously estimated at 202,400 to 214,000 sq. m., including the states of W. Va., Ky., and Tenn., and portions of nine other states. At Pittsburg the river is 1,021 ft. above sea-level. It has a mean fall of ·72 of a ft. per mile, and at Cairo has an elevation of 322 ft. The onward course of the current ranges from one to three m. per hour. The river varies in width from about 1,000 ft. at Pittsburg to 3,000 ft. at its mouth. At high water its breadth is greatly increased. Its depth is extremely variable. At low water it may be forded at many points above Cincinnati. In floods it rises from 30 to 60 ft. above the low water level. At Louisville there are rapids in which the river falls about 27 ft. in 2½m., but a canal through which large vessels can pass has been constructed. Thus an excellent water-power is supplied and navigation is but slightly impeded. The upper part of the river is generally closed by ice during the winter, and in low water navigation is difficult; but in high water the river and its tributaries offer for large boats a total of 5,000 m. of navigation. At all times steamers can pass as far as Louisville, and during a large part of the summer they are able to reach Wheeling without difficulty. In addition to the two main streams by which it is formed, the Ohio river re-

ceives the waters of the Little Kanawha, Great Kanawha, Sandy, Licking, Kentucky, Green, Cumberland, and Tennessee rivers from the s., and the Muskingum, Hocking, Sciota, Great Miami, Little Miami, and Wabash rivers from the n. In the main river there are numerous islands which have been brought under cultivation, and a still larger number of sand-banks appear in its shallow portions. The valley through which it flows presents no grand or imposing features but is noted for quiet beauty, fertile soil, and for the deposits of coal and iron in the ranges of hills through which its upper portion passes. In some places the banks of the tributaries are almost perpendicular, the water having gradually cut its deep and narrow course through the soft limestone of which they are formed, while those of the main river often rise in a series of terraces which spread over quite an area and give a picturesque appearance. The latter formation is seen at Cincinnati, which is built upon two broad terraces, the upper being 52 ft. higher than the other. The constructions of the mound-builders are found in large numbers along the shores of the tributaries entering the lower portion of the river. Among the important towns on the banks of the main stream are Pittsburg, Wheeling, Parkersburg, Ironton, Portsmouth, Newport, Cincinnati, Covington, Louisville, Evansville, Paducah, and Cairo.

OHIO COMPANY, THE: see PUTNAM, RUFUS.

OHIO STATE UNIVERSITY: co-educational institution at Columbus, O.; opened in 1873. Founded on a congressional land grant of 1862, in 1866 an act passed the State legislature providing for the establishment of the Ohio Agricultural and Mechanical College, but no action was taken until 1870. In 1878 the instutition was reorganized as Ohio State Univ. and comprises six colleges: (1) of agriculture and domestic science; (2) of arts, philosophy and science; (3) of engineering; (4) of law; (5) of pharmacy; (6) of veterinary medicine. The instruction in agriculture, engineering and science, has always been a prominent feature of the univ. work; and its laboraroties and museums of geology, agriculture, mechanics, and metallurgy are especially well equipped; a lake laboratory for biology is maintained at Sandusky. Women are admitted to all departments. The degrees of A.B., B.S., and PH.B. are conferred by the college of arts, science, and philosophy. The total annual income averages $420,000 derived from fees, from the annual Federal Appropriation, for the state land grant, and legislative grant. The faculty numbers 136, and the annual enrollment of pupils averages 1,500.

OHIO UNIVERSITY: co-educational institution at Athens, O.; projected 1787; organized 1804; opened 1809; first commencement 1815; first pres. and faculty

chosen 1822. It has about 40 professors and instructors; 550 students; 21,000 vols. in its libraries; and total income $85,000. The endowment, based on a purchase of land by the Ohio company from the federal govt., became impaired by lack of legislative appreciation, and 1895 amounted to $125,000. Since its organization the univ. had graduated several hundred students, the first one being the famous Thomas Ewing.

OHIO WESLEYAN UNIVERSITY: educational institution at Delaware, Delaware co., O. Upon the grounds are sulphur springs which once had quite a reputation. A hotel and several cottages were built: but 1841 the property was offered for sale, and after consultation with leading men the citizens of Delaware purchased and presented it to the Meth. Episc. denomination on condition that a satisfactory institution of learning be located on the grounds. The condition was accepted by the church authorities, a preparatory school was commenced 1842, and the institution was formally opened as a university 1844, Nov. 14. The faculty consisted of five persons, only three of whom were able to be present at the beginning of the term, and there were only 29 students. There were many difficulties and discouragements in the early years of the institution but by the earnest efforts of its friends they were gradually overcome. The university now has beautiful grounds, adorned with about 800 varieties of trees and shrubs, numerous buildings, an excellent equipment, and takes high rank of the educational institutions of its denomination. The grounds and buildings are valued at $743,000, and the productive funds amount to $530,460. The library contains over 50,000 volumes. Beside the collegiate department, there are a preparatory department, a commercial department, a school of medicine, and schools of music and of fine arts. The school of medicine located at Cleveland, was formerly an independent school (founded in 1863); it was united with the univ. in 1896 under the title of the Cleveland College of Physicians and Surgeons of Ohio Wesleyan Univ. Women are admitted to all departments of the univ. The degrees conferred are bachelor of arts, bachelor of science, and bachelor of letters. The faculty numbers 75, there is an average annual enrollment of 1,555 students; and since its foundation over 25,000 have graduated from the univ. many of whom have entered the ministry.

OHLAU, or OLAU, *ō'low*, or OLAWA, *ō-lâ'vâ:* town of Prussian Silesia, 17 m. s.e. from Breslau, on the Oder. O. is on the railway between Breslau and Vienna; it is an ancient town, with a royal palace and an old castle. At present it has considerable industrial activity. Being the cap. of a circle, it has numerous district courts and offices. Pop. 9,250.

OHM, n. *ōm*, the practical unit of electrical resistance, adopted in 1881 by the International Congress of Electricians at Paris, the centimetregram-second unit formerly in use having proved too minute for convenient reckoning. The ohm, named after the German physicist Ohm (q.v.), equals 1,000,000,000 (10^9) C. G. S. electro-magnetic units of resistance; a microhm is a resistance of one millionth of the ohm; and the megohm is a measure 1,000,000 (10^6) times the ohm. The ohm may be independently defined as the electrical resistance to an unvarying current offered by a uniform column of mercury at 0° C., 106.3 centimetres in length, with a mass of 14.4521 grams.

OHM, *ōm*, Georg Simon, German physicist: b. Erlangen, 1787, March 16; d. Munich, 1854, July 7. He was educated at the University of Erlangen. In 1817 he became a teacher at the gymnasium in Cologne, and in 1826 at Berlin; from 1833 to 1849 he was director of the polytechnic school at Nuremberg, and in 1849 went to Munich as professor of physics at the university. His researches were chiefly concerned with galvanic currents, and he formulated the law which is known as Ohm's law; that, the current is directly proportional to the electro-motive force and inversely proportional to the resistance. This law was first stated in his *Bestimmung des Gesetzes nach welchem die Metalle die Kontaktelektrizität leiten* (1826), and was further developed and proved in *Die galvanische Kette mathematisch bearbeitet* (1827); in English *The Galvanic Chain Mathematically Worked Out* (1841). He also wrote *Beiträge zur Molekularphysik* (1849), and *Grandzuge der Physik* (1854); his collected writings were published by Lommel in 1892. His name was given to the practical unit of electrical resistance in 1881. Consult Mann, 'Georg Simon Ohm' (1892).

OHM'S LAW [named from the electrician, *Ohm*, Georg Simon (q.v.)]: law declaring that the intensity of a galvanic current is equal to the electro-motive force divided by the resistance.— The unit of electro-motive force is called a *volt;* the unit of quantity in electrical measurement a *coulomb* or *weber;* the unit of strength of current, an *ampère;* the unit of capacity of electricity, a *farad.*— Also Megavolt, n. *mĕg'ă-vōlt* [Gr. *mega*, great]: one million volts. Megafarad, *n. mĕg'ă-far-ăd* [*mega*, and *farad*]: one million farads. Megohm, n. *mĕg'ōm* [*mega*, and *ohm*]: one million ohms. Microvolt, *n. mĭk'rō-vōlt* [Gr. *mikros*, small, and *volt*]: one millionth of a volt. Microfarad, n. *mĭk'rō-făr'ăd* [*mikros*, and *farad*]: one millionth of a farad. Microhm, n. *mī'krōm* [*mikros*, and *ohm*]: one millionth of an ohm.

OIDIUM, n. *ō-ĭd'ĭ-ŭm* [Gr. *oi dĕin*, to swell up]: important genus of minute fungi of the group *Hyphomycetes*, growing on deceased animal and vegetable substances. They consist of minute tubular threads, forming flocks, white in some species, brightly colored in others, simple or irregularly branched, assuming in their upper part the form of strings of beads, which finally break up into elliptic spores. Thirty-five species have been described. Among the most important of the vegetable parasites of man is *O. albican*, found on the epithelium in the mouth and throat in the disease called

Fig. 1.—Thrush Fungus (*Oïdium albicans*): general view.

aphthæ, or thrush, also sometimes in the nostrils, stomach, and intestines, on the nails, the nipples, and other places. It is more frequent in children and aged persons, than in those in the prime of life. It occurs frequently in the last stages of many diseases, when the mucous membrane is covered with nitrogenous decomposable matter. Indeed, it seems that whatever may be the case as to other vegetable parasites, no species of O. begins its attack on a perfectly healthy surface, either animal or vegetable; a diseased state of the tissue being to these fungi a necessary condition of vegetation. *O. albicans* appears to the naked eye as a white pasty substance, slightly elevated above the mucous membrane to which it adheres; but under the microscope its filamentous structure is easily perceived. Its seat is at first on the upper surface of the epithelial cells, but its filaments soon penetrate deeply between

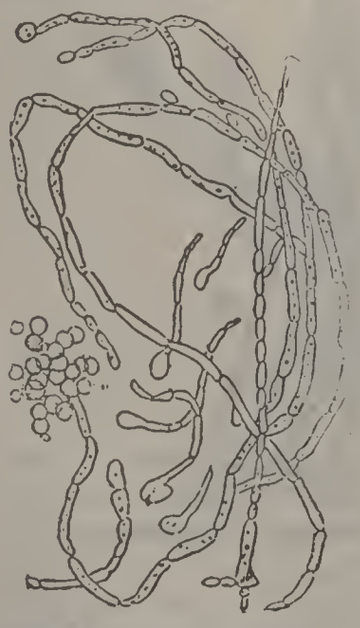


Fig. 2.—Perfectly developed thallus threads, showing constrictions, partition-walls, and ramifications.

them, and the upper epithelial layers are thrown off by the rapid growth from below.

Another species of O. which has attracted great attention is *O. Tuckeri*, regarded by many as producing the grape disease, which, several years ago, injured the vineyards of many parts of the world, but in accordance with the views above expressed, perhaps to be regarded rather as merely accompanying and extending the disease. It may probably be the case that over-cultivation of particular varieties of grape, and too long continued cultivation of the same ground, have so impaired the vigor and healthfulness of the plants, as to make them liable to the attacks of this parasite. *O. Tuckeri* makes its appearance at first in the form of a *mycelium* of webby, creeping, branching filaments (fig. 4, *b*), which send out upright or decumbent jointed stems (fig. 4, *a*). The bead-like joints of the stems become successively filled with spores, which are finally discharged in little clouds for the multiplication of the species. The grape disease was first observed in Kent, England, in the spring of 1845, on vines in the vinery of Mr. Tucker. The ends of the young shoots assumed a crispy appearance, began to wither, and then dried up. The unripe grapes were next attacked, becoming covered with a grayish-white bloom, the skin of the grapes being destroyed, and they rotted and dried up. The disease rapidly spread over other English vineries; was observed about the same time in the vineries of Paris, and soon in the vineyards of almost all parts of France,

Fig. 3.—Ends of perfectly developed thallus threads, more highly magnified (160 diameters).

Fig. 4.—Grape Fungus (*Oïdium Tuckeri*): early stage.

Italy, Greece, Tyrol, and Hungary; finally, and in a slighter degree, affecting the vineyards of the Rhine. Its ravages extended to Algeria, Syria, Asia Minor, and many other

countries, particularly the island of Madeira, where it proved almost completely destructive to the grapes, and nearly put an end to the production of the celebrated Madeira wine. The importation of Madeira wine to Britain, 1831, was 209,127 gallons; 1861, only 28,749 gallons. It is probable that the complete isolation of the Madeira vineyards made the progress of the disease more rapid, and its results more complete than elsewhere, by causing a prevalence of the conditions favorable for it. No kind of vine escaped. The grape disease is perceived first in the leaves, which become whitish, in consequence of a mycelium spreading over the upper surface of the leaf. The leaves sometimes curl up, or they become black at the centre, the blackness extending toward the circumference, and finally they drop off. The plant, through loss of its leaves, now becomes more unhealthy; the shoots are attacked by the disease, the stalks of the bunches of grapes, and the grapes themselves. The parasite penetrates into the young wood, the shoots are covered with spots and blotches of a reddish brown, or even black color, and look as if a red-hot iron had been applied to them. Sometimes they secrete a clammy inodorous fluid all over their surface; and in many cases they wither from the top down half their length. The affected grapes very often first exhibit the disease in a single whitish spot on a single grape of a bunch, which enlarges by radiating irregularly. Fig. 5 represents a fragment of a grape with mycelium and erect fertile filaments. If in a bunch there is one

Fig. 5.—Fragment of surface of Grape, with oidium fully developed

abortive grape, it often shows signs of the disease, while the rest remain free. The creeping branches of the mycelium are fixed upon the skin of the grape by rootlets, which do not penetrate into the juicy pulp. The mycelium sends up vertical fertile branches of nearly equal height, densely aggregated, and forming a velvet-like mass. The extremities of these become beaded; and at last the uppermost cell or bead increases in volume, becomes detached, and is carried off by some slight breath of air, to multiply the species by the dispersion of its spores. The other bead-like cells follow in succession.

Various means were resorted to for the prevention and cure of the grape disease. The application of pulverized sulphur was found useful, the fungus withering and drying up when brought into contact with a minute particle of sulphur. The application of sulphur must be frequent, as portions of the mycelium and some of the spores always escape. The use of sulphur was the chief means of checking the spread of O. in French and other European vineyards; it became general in s. France and in Italy; and in consequence of its national importance, the duty on sulphur was reduced by the French govt. Hydrosulphide of lime also was applied to vines with very beneficial effect. It is prepared by thoroughly mixing 63 ounces of flowers of sulphur with the same quantity of slaked lime, adding three or four quarts of water, boiling for about ten minutes, allowing it to settle, and decanting the clear liquor. When used, one quart is mixed with 100 quarts of water, and it is poured over the vines.

OIL, n. *oyl* [OF. *uile* and *oile*—Sp. *olio*—from L. *ŏlĕŭm*, oil: Ger. *oel;* Dan. *olie*, oil]: highly inflammable fatty liquid expressed or obtained from various animals, from many vegetable substances, and as a natural product from the earth (see OILS): V. to smear or rub over with oil. OIL'ING, imp. OILED, pp. *oyld.* OILY, a. *oyl'ĭ*, containing or resembling oil; greasy. OILINESS, n. *oyl'ĭ-nĕs*, the quality of being oily; greasiness. DRYING OILS, oils which dry and lose their greasy feeling, as *linseed* oil, as distinguished from UNCTUOUS OILS, which do not so dry, as *olive* oil. VOLATILE or ESSENTIAL OILS, oils that pass away in the form of vapor at the temperature of boiling water. MINERAL OIL, an oil extracted from a shale or mineral, as *paraffin.* ROCK-OIL, a natural oil which rises from the earth, as from a spring or well. OIL-CAKE, flat cakes of flax-seed, rape-seed, etc., from which the oil has been expressed (see below). OIL-COLORS, painters' colors or pigments formed of finely ground mineral substances worked up with oil. OILED PAPER, transparent paper used for tracing purposes. OILED SILK, prepared silk impervious to moisture, employed in making balloons, etc. OILING OUT, among *artists*, a thin coating of drying oil passed over the parts of a picture to be retouched, which is immediately wiped off, leaving thus only a slight coating on the surface. OIL-CLOTH, painted floor-cloth (see FLOOR-CLOTH). OIL-GAS, a gas obtained from oil. OILMAN, one who sells oils. OIL-MILL, a mill for crushing seeds in order to obtain their oil. OIL-NUT, the butternut of N. Amer., a shrub; the Palma Christi. OIL-PAINTING, a picture painted with colors which have been mixed with oil; the art of painting in oil-colors. OILSKIN, a sort of waterproof cloth. OIL STONE, a sort of hone-stone of a white or black color, imported from Turkey. OIL-TREE, the Palma Christi, or castor-oil plant. OIL OF VITRIOL, the popular name for sulphuric acid. OILY GRAINS, the seeds of the sesamum, an eastern grain-plant which contains abundance of oil. OIL-COALS, the coals or shales which yield large quantities of oil on distillation. OIL-SPRINGS, or OIL-WELLS, springs in which oil rises out of the earth as a natural production, like springs of water.

OIL-CAKE: cake which remains in the press, when seeds are crushed to express the oil which they contain. Oil-cake still retains a portion of the oil of the seed with almost all its other constituents, and is valuable either for feeding cattle or for manure. In some countries *Linseed-cake* is so much more largely used than any other kind, that the name oil-cake is in general appropriated to it, the other kinds being known as *Rape-cake, Poppy-cake, Hemp-cake, Colza-cake*, etc., according to the plant from whose seed they are produced. The use of oil-cake for feeding cattle has very much increased of late years, and it is an article of commercial importance. Large quantities are exported from different parts of Europe and from N. America. But *English Linseed-cake*—cake made at oil-mills in England, mostly from imported seed—is preferred to any other, because heat not being so freely applied during the expression of the oil, more oil is left in the cake, and also because foreign cake often receives injury from dampness both before and during the sea passage. Besides the oil which remains in it, linseed-cake contains 24 to 33 per cent. of nitrogenous substances or protein compounds, which make it very valuable both for feeding cattle and for manure. The value of linseed-cake for feeding is greater than that of any kind of grain or pulse.—*Rape-cake* is much cheaper than linseed-cake, but is not relished by cattle, having a hot taste, and a tendency to become rancid. Sheep, however, eat it readily, and it is often used for fattening them. It is also ground to a coarse powder (*rape-dust*), and used as manure. Its fertilizing power is great, and it is used by the Flemish farmers as guano has been used by those of the United States.—*Cotton Seed-cake* is much used as a manure in parts of N. America.—*Cocoa-nut-cake* is used in s. India, both for feeding cattle and for manure.—For some other kinds of oil-cake, see the plants from which they are derived. Their properties are generally similar to those of linseed-cake, though the pungency of some, as *Mustard-cake*, renders them unsuitable for feeding cattle. See OILS.

OIL CITY: city, Venango co., Penn., at the junction of Oil creek with the Allegheny river, on the Allegheny Valley, the Western New York and Pennsylvania, the Erie, and the Lake Shore and Michigan Southern railroads; eight m. from Franklin, the cap. of the co., 132 m. from Pittsburg. The business portion of the city is close to the river, and nearly all the residences are built on the higher land. The buildings are largely of brick, the streets are paved and lighted with gas, and there is a good system of municipal water-works. The Standard Oil Co. and other office buildings, the Oil Exchange, church and school buildings, Carnegie Free Library, city hospital, opera house, banking institutions are prominent features. The city is the great centre of the petroleum production of the country. Manufactures are not extensive; but there are wagon shops, foundries, barrel shops, and oil-refining works. The river flows through the city, and is crossed by fine bridges. From Clark's Summit, to which access is gained by an inclined railroad, a beautiful view is obtained. The first oil-well in the place was sunk 1859. There were then only 12 families residing within the present limits of the city, but its growth for a few years was quite rapid. The place was incorporated as a borough 1862. and received a city charter 1871. Pop. (1880) 7,315; (1890) 10,932;(1910) 15,657.

OIL FUEL: see PETROLEUM.

OILLET, or OILLETTE, or OYLET, n. *oy'lĕt* [F. *œillet*, dim. of *œil*, an eye]: in *arch.*, openings or loopholes made in the battlements and walls of mediæval fortifications, through which arrows were discharged at the besiegers.

OIL ON THE WAVES: means of safety for vessels in storms, the efficacy of which, though known to the ancients, has only of late received practical recognition among modern seamen. The action of the oil consists in preventing the combs of the waves from breaking and sweeping over the vessel's deck. Detailed directions for the employment of oil in various circumstances of danger at sea are now given in works on practical seamanship, and vessels go to sea provided with the necessary oil and appliances for diffusing it on the water. If a bar is to be crossed in heavy weather, after battening down all hatches, etc., 2 pieces of India-rubber pipe, abt. 20 ft. long and 1-in. diameter, are to be put through the hawse-pipes, one on each side, and their ends allowed to trail in the sea. On the upper end of each piece of tube, a good-sized funnel is to be lashed, and secured to the stanchion in a vertical position, and a man stationed at each with a 3-gal. can of colza-oil. When the vessel enters the outermost sea that breaks on the bar, each man gently pours the oil down the pipe. This will smooth the bar, and the vessel will steer much better. Almost any oil of animal or vegetable origin will do; but petroleum is not of much service, except to mix with and thin other oil, if requisite.

OIL PALM (*Elæis*): genus of palms, of the same tribe with the cocoa-nut palm. The best known species, the

Oil Palm.
(Copied from Livingstone's *Travels in Central Africa.*)

O. P. of tropical Africa, sometimes attains a height of 60–80 ft. The stems are thickest in the middle, tapering chiefly upward. The leaves are pinnate, their footstalks spiny. The flowers have a strong peculiar smell, like that of anise or chervil. The fruit forms an immense head, like a great pineapple, consisting of a great number of bright orange-colored drupes, having a thin skin, an oily pulp, and a hard stone. The pulp of the drupes, forming about three-fourths of their whole bulk, yields, by bruising and boiling, an oil, which when fresh has a pleasant odor of violets, and when removed into colder regions acquires the consistency of butter. This oil is now very largely exported from tropical Africa to western lands, and is much used for many purposes, e.g., for making candles, toilet soaps, etc., and for lubricating machinery and wheels of railway carriages. When fresh, it is eaten like butter: see OILS. The nut was formerly rejected as useless after the oil had been obtained from the fruit; but from its kernel a fixed oil is now extracted called PALM-NUT OIL; which is clear and limpid, and has become to some extent an article of commerce. The O. P. abounds in mangrove swamps, but is a conspicuous feature of the landscape also on sandy coasts in tropical parts of w. Africa. It yields from its trunk abundance of a pleasant and harmless beverage, which, however, becomes intoxicating in a few hours; called *Malova* in Angola, and much used there as an alcoholic stimulant. The unripe nuts of the O. P. are used in parts of Africa for making an excellent kind of soup. The O. P. has been introduced into warmer parts of America, and has become abundant in them.

OILS.

OILS (including the Fats): an important and well-marked group of organic compounds abundant both in the animal and in the vegetable kingdoms. They are not simple organic compounds, but each of them is a mixture of several such compounds to which the term *glycerides* is applied; and the glycerides which by their mixture in various proportions form the numerous fats and oils are mainly those of palmitic, stearic, and oleic acids—if we adopt the recent view that Margaric Acid (q.v.) has no independent existence—and to a less extent those of other fatty acids, noticed below, such as butyric, caproic, caprylic, and capric acids, obtained from butter; myristic acid, obtained from cocoa-nut oil, etc. The members of this group may be solid and hard, like suet; semi-solid and soft, like butter and lard; or fluid like the oils. The solid and semi-solid are, however, generally placed together and termed fats, in distinction from the fluid oils. The most solid fats are readily fusible, and become reduced to a fluid or oily state at a temperature lower than that of the boiling point of water. They are not volatile, in other words they cannot be distilled without decomposition, and it is not until a temperature between 500° and 600° is reached that they begin nearly simultaneously to boil and to undergo decomposition, giving off acrolene (an acrid product of the distillation of glycerine) and other compounds. In consequence of this property these oils are termed *fixed oils*, in contradistinction to a perfectly separate group of oily matters, on which the odoriferous properties of plants depend, and which, from their being able to bear distillation without change, are known as *volatile oils*. These, known also as *essential* or *ethereal oils*, differ *in toto* in chemical composition from the compounds which we are now considering, and will be separately noticed in the latter part of this article. All the fats and oils are lighter than water, and are perfectly insoluble in that fluid. Their specific gravity ranges from about 0·91 to 0·94. They dissolve in ether, oil of turpentine (one of the volatile oils), benzol, and to a certain extent in alcohol; while on the other hand they act as solvents for sulphur, phosphorus, etc. If a fatty matter be shaken with a watery solution of albumen, gum, or some other substance that increases the density of the water and renders it viscid, the mixture assumes a milky appearance, in consequence of the suspension of the fat or oil in the form of microscopic globules, and is termed an *emulsion*. These bodies possess the property of penetrating paper and other fabrics, rendering them transparent and producing what is well known as a greasy stain. They are not readily inflammable unless with the agency of a wick, when they burn with a bright flame. In a pure and fresh state they are devoid of taste and smell, but on exposure to the air they become oxidized and acid, assume a deeper color, evolve a disagreeable odor, and are acrid to the taste; or, in popular language, they become *rancid*. The rapidity with which this change occurs is considerably increased by the presence of mucilaginous or albuminous bodies.

The rancidity may be removed by shaking the oil in hot water in which a little hydrated magnesia is suspended.

For the general diffusion of fats and oils in the animal kingdom, see FATS, ANIMAL. In the vegetable kingdom they are equally widely distributed, there being scarcely any tissue of any plant in which traces of them may not be detected; but they are abundant specially in the seeds. The seeds of the *cruciferæ* are remarkably rich in oil; linseed yielding fully 20 per cent., and rape-seed about 40 per cent. of oil; and some fruits, as those of the olive and oil-palm, yield an abundance of oil.

The uses of the oils and fats are numerous and highly important, various members of this group being extensively employed as food, as medicines, as lubricating agents, in the preparation of soaps, plasters, ointments, varnishes, pigments, candles and other means of illumination, for the purpose of dressing leather, etc. The following are the most important members of the group.

1. *Vegetable Fats.*—The chief solid fats of vegetable origin are cocoa-nut oil, nutmeg butter, and palm oil. The fluid vegetable fats or oils are divisible into *non-drying* and *drying oils;* the latter being distinguished from the former by their becoming dry and solid when exposed in thin layers to the air in consequence of oxygenation, while the former do not absorb oxygen, but are converted by hyponitric acid or suboxide of mercury into elaidine (see OLEINE), a reaction not exhibited by the drying oils. Some of the drying oils, especially linseed oil, when mixed with cotton, wool, or tow, absorb oxygen so rapidly and consequently become so heated as to take fire, and many cases of the spontaneous combustion of heaps of oily materials that have been employed in cleaning machinery have been recorded. The drying property may be much increased by treating the oils hot with a little litharge or with borate or oxide of manganese; linseed oil thus treated is known as *boiled oil.* The chief non-drying oils are olive oil, almond oil, and colza oil; while the most important drying oils are those of linseed, hemp, poppy, and walnut; castor oil seems to form a link between these two classes of oils, since it gradually becomes hard by long exposure to the air.

2. *Animal Fats.*—The chief solid fats are suet, lard, butter, goose grease, etc., while among the fluid fats or oils, sperm oil, ordinary whale oil, cod-liver oil, and neats-foot oil may be especially mentioned. In many of their characters, spermaceti and bees-wax resemble the solid fats, but (see those titles) they are not glycerides. As a general rule, stearin and palmitin, both of which have comparatively high fusing points (between 157° and 114°), preponderate in the solid fats; while oleine, fluid at 32°, is the characteristic constituent of the oils.

One or two of the most important of the decompositions of the fats must be noticed. When any of these bodies are heated with hydrated alkalies they undergo a change which has long been known as Saponification, or conversion into Soap (q.v.), in which the fatty acid combines with

the alkali to form a *soap*, while the sweet viscid liquid glycerine is simultaneously formed. The combination of a fatty acid with oxide of lead, also a true saponification, produces free glycerine and a *lead soap* used in pharmacy, and termed *lead plaster*. For further details on these points see SOAP: PLASTERS.

The process of saponification affords a ready means of isolating the fatty acids, as the stearic or oleic acid may be at once separated from an alkaline stearate or oleate by the addition of hydrochloric or tartaric acid. When the fatty acids are, however, required on a large scale, as for manufacture of the so-called stearine candles, which in reality consist mainly of stearic and palmitic acids, sulphuric acid and the oil or fat are made to act on each other at high temperature: see CANDLE. The fatty acids may be procured in a very pure form also by the injection of superheated steam at a temperature between 500 and 600° into heated fat—a process which, according to Prof. Miller, 'from its simplicity and from the purity of the products which it yields, bids fair to supersede those previously employed in the preparation of the fatty acids for illuminating purposes.'

The only fatty acids which have been specially mentioned in this article are those which occur in natural glycerides, such as stearic, palmitic, and oleic acids. The term *fatty acid* has, however, in Chemistry a wide signification, and is applied to many acids homologous to stearic acid, but not occurring in any natural fats or oils. Thus stearic acid may be taken as the type of a group of acids (of which 17 are already known) represented by the general formula $C_nH_{2n}O_2$, commencing with formic acid (CH_2O_2), including acetic, propionic, butyric, valeric (or valerianic), caproic, œnanthylic, caprylic, pelargonic, capric, lauric, myristic, palmitic, stearic, arachidic, and cerotic acids, and terminating with melissic acid ($C_{30}H_{60}O_2$). These are divided into the volatile and the true (or solid) fatty acids; the volatile acids being those from formic to capric acid, while the remainder, beginning with lauric acid, are the true fatty acids. The *volatile fatty acids* are fluid and for the most part oily at ordinary temperatures, may be distilled without change, possess a pungent odor, and are acrid to the taste, and their solutions redden litmus paper strongly. The *true fatty acids*, on the other hand, are solid at ordinary temperatures, are devoid of taste and smell, cannot be distilled, except *in vacuo*, without decomposition, and exert only a slight action on litmus. The volatile acids occur in the animal and vegetable kingdoms (formic acid, e.g., in red ants, and valeric acid, in the root of valerian), and they are produced likewise by the oxidation and spontaneous decomposition of numerous animal and vegetable products. The entire series up to capric acid may be obtained by oxidizing oleic acid with nitric acid. The true or solid acids occur only as constituents of animal and vegetable fats.

Some chemists make a second group of fatty acids, of which oleic acid is the type, and which have the general

formula $C_{2n}H_{2n-2}O_4$; but Oleic Acid (q.v.) is the only member of this group of any practical importance.

A complete list of even the chief fats and fixed oils would take up far more space than we can command. For many of the principal oils, and some account of their properties and uses, see the separate titles, e.g., ALMOND OIL, CASTOR OIL, CROTON OIL; or see the titles of the substances from which they are procured, e.g., LINSEED, RAPE, CANDLE-NUT.

The *Volatile* or *Essential Oils* exist, in most instances, ready formed in plants, and are believed to constitute their odorous principles. They form an extremely numerous class, of which most of the members are fluid; a few (oil of aniseed for example) being solid at ordinary temperatures, but all are capable of being distilled without undergoing change. They resemble the fixed oils in their inflammability, in their solubility in the same fluids, and in their communicating a greasy stain to paper or any other fabric; but the stain in this case soon disappears, and they further differ in communicating a rough and harsh rather than an unctuous feeling to the skin. Their boiling points are in almost all cases far higher than that of water, but when heated with water they pass off with the steam—a property on which one of the chief modes of obtaining them depends: see PERFUMERY. The oils have characteristic penetrating odors, which are seldom so pleasant as those of the plants from which they are obtained, and their taste is hot and irritating. They vary in specific gravity, but most of them are lighter than water, and refract light strongly. Most of them are nearly colorless when fresh, but darken on exposure to light and air; but a few are green, and two or three of blue color. By prolonged exposure they absorb oxygen and become converted into resins.

By far the greater number of them are products of the vital activity of plants, in which most of them exist ready formed, being inclosed in minute cavities often visible to the naked eye. Although diffused through almost every part of a plant, the oil is especially abundant in particular organs of certain families of plants. In the *Umbelliferæ*, it is most abundant in the seeds; in the *Rosaceæ*, in the petals of the flowers; in the *Myrtaceæ* and *Labiatæ*, in the leaves; in the *Aurantiaceæ*, in the rind of the fruit. As in the case of the animal and vegetable fats and fixed oils, so most of the essential oils occurring in plants are mixtures of two or more distinct chemical compounds, one of which usually contains no oxygen, while the others are oxidized. Of these, the former, which is a pure hydrocarbon, is the more volatile, and acts as a solvent for the others. Most of these oils, when cooled, separate into a solid and a fluid portion, to which the terms *Stearopten* and *Elæopten* have been applied.

In the comparatively few cases in which the oils are not formed naturally they are produced by a species of fermentation, as in the case of Oil of Bitter Almonds and Oil of Mustard (q.v.), while others are the product of dry distillation or of the putrefaction of many vegetable bodies.

Some of the natural oils, as those of cinnamon, spiræa, and wintergreen, also have been artificially produced.

The essential oils are much employed in the fabrication of Perfumery (q.v.), for flavoring liquors, confectionery, etc., for various purposes in the arts (as in silvering mirrors), and in medicine. The special uses of the most important of these oils in medicine will be noticed subsequently.

The members of this group, which is an extremely numerous one (between 100 and 200 essential oils being noticed in works devoted to the specific treatment of this subject), admit of arrangement under four heads. 1. Pure Hydrocarbons; 2. Oxygenous Essential Oils; 3. Sulphurous Essential Oils; 4. Essential Oils obtained by Fermentation, Dry Distillation, etc.

1. The *Pure Hydrocarbons* are mostly fluid, and have lower specific gravity, a lower boiling point, and higher refractive power than the oxygenous oils. They absorb oxygen, and are converted into oxygenous oils and resins. They may be separated from oxygenous oils, with which they are usually associated, by fractional distillation. They include oil of turpentine ($C_{10}H_{16}$), and the oils of bergamot, birch, camomile, caraway, cloves, elemi, hop, juniper, lemons, orange, parsley, savine, and valerian, most or all of which contain the same hydrocarbon as Oil of Turpentine (q.v.), and in addition to it an oxidized compound; oil of copaiva ($C_{15}H_{24}$), attar of roses (C_8H_{16}), etc.

2. The *Oxygenous Essential Oils* may be either fluid or solid, the latter being termed also *Camphors*. A stearopten separates from most of the fluid oils on cooling. They are more soluble in water and spirit of wine than the pure hydrocarbons. They may be divided into (1.) those which are fluid at ordinary temperatures, such as those of aniseed, camomile,* cajeput, caraway,* cinnamon, cloves,* fennel, lavender, peppermint, rue, spiræa, thyme,* wintergreen, etc. Those marked with a (*) are associated with the pure hydrocarbons above described. (2.) The camphors, such as ordinary camphor ($C_{10}H_{16}O$), Borneo camphor ($C_{10}H_{18}O$), etc.

3. The *Sulphurous Essential Oils* are chiefly obtained from the *Cruciferæ*. They all probably contain the radical *allyl* (C_3H_5). The oils of garlic and of mustard (see these titles), and those of horse-radish, scurvy-grass, and asafetida, are the best illustrative of this division.

4. Among the essential oils obtained by fermentation, dry distillation, etc., are the oils of bitter almonds and of black mustard, the oils of milfoil, plantain, centaury, etc. (whose leaves have no smell until they have been moistened for some time with water, when a kind of fermentation is set up and oil is yielded in abundance), Furfuramide (q.v.), etc.

The pharmacopœia contains the essential oils of anise, cajeput, caraway, camomile, cinnamon, cloves, copaiva, coriander, cubebs, dill, juniper, lavender, lemon, nutmeg, peppermint, pimento, rosemary, rue, savine, spearmint, and turpentine. Of these, the oils of anise, cajeput, caraway,

camomile, coriander, dill, peppermint, pimento, and spearmint are used as stimulants and antispasmodics in cases of flatulence, griping, etc., and to disguise the nauseous taste of various medicines. The oils of cajeput, cinnamon, and rue act similarly but more powerfully. The oils of copaiva and cubebs act in the same manner as the substances from which they are derived; oil of juniper is a powerful diuretic, and oil of savine (and to a less extent oil of rue) an emmenagogue. The oils of lavender and lemon are used to conceal the smell of sulphur ointment and to give an agreeable odor to lotions, etc. The oil of rosemary is employed chiefly as a stimulating liniment, especially in cases of baldness, and the oil of nutmeg is seldom given medicinally except in the form of aromatic spirit of ammonia, into the composition of which it enters.

Essential oils for flavoring are not always derived from the substances of which they are intended to communicate the flavor. Thus an essential oil indistinguishable (or nearly so) from that of pine-apples may, by recent methods, be obtained from butyric acid, a product of rancid butter or putrid cheese; and a very serviceable 'essence of pears' is procured from the offensive fusil oil.

Bland oils—such, for example, as olive oil—were much used by the ancients as external applications in various forms of disease. Celsus repeatedly speaks of the use of oil applied externally with friction in fevers, and in various other diseases. Pliny says that olive oil warms the body and at the same time cools the head, and that it was used with these objects previously to taking cold baths. Aretæus recommends a sitz-bath of oil in cases of renal calculi, and Josephus relates that a similar mode of treatment was employed in the case of Herod. Galen prescribed 'oil and wine' for wounds in the head; and the parable of the good Samaritan affords additional evidence that this was a common mode of treating wounds. The use of oil preparatory to athletic exercises is referred to by numerous Greek and Latin writers.

As a cosmetic—that is to say, as a means of giving to the skin and hair a smooth and graceful appearance—its use has been prevalent in hot climates from the earliest times. There is abundant historical evidence of this use of oil among the Egyptians, the Jews, the Greeks, and the Romans; and Pliny's statement that butter is used by the negroes and the lower class of Arabs for the purpose of anointing is confirmed by the observation of all recent African travellers. In hot climates there is doubtless a practical as well as an æsthetic object in anointing. The oil, being a bad conductor of heat, affords a certain amount of protection against the direct action of the solar heat; it is likewise serviceable as a protection against the attacks of insects and as checking excessive perspiration. The fact that oily and fatty matters are bad conductors of heat serves also to explain why the Esquimaux and other dwellers in Arctic regions have recourse to the inunction of the blubber, etc. In their case the oily investment serves to prevent the escape of the bodily heat.

The Greeks and Romans not only employed oil for the purposes above mentioned, but in their funereal rites, the bodies of their dead being anointed with oil, with the view probably of postponing incipient decomposition. A similar practice existed among the Jews, and in the Gospels are various passages in which the Lord Jesus referred to his own body being anointed by anticipation. It appears from the evidence of St. Chrysostom and other writers that this ancient usage of anointing the bodies of the dead was long retained in the Christian Church: see UNCTION: EXTREME UNCTION.

It is noticeable that the ancient system of anointing, as a medical treatment, has to some extent been revived in modern times. Many physicians of the present day combine the inunction of cod-liver oil with its internal administration, a combination recommended first by Prof. Simpson of Edinburgh; and Sir Henry Holland advocates the practice of anointing the harsh, dry skin of dyspeptic patients with warm oils. There can be little doubt that in many forms of disease the local application of medicinal oils is advantageous.

For the *mineral oils*, see NAPHTHA: PARAFFIN: PARAFFIN OIL: PETROLEUM: SHALE.

OILS IN THEIR COMMERCIAL RELATIONS.—The solid animal oils found in commerce are butter and lard, tallow, mares' grease, goose grease, neats-foot oil, and unrefined yolk of egg oils. For two first, see BUTTER: LARD. Tallow is the fat of oxen and sheep, especially the fat which envelops the kidneys and other parts of the viscera, rendered down or melted. The qualities of this solid oil render it particularly well adapted for making candles, and until the end of the first quarter of the 19th c. candles for ordinary use were almost wholly made of it, the high price of wax and spermaceti preventing their employment except by the most wealthy and for ecclesiastical purposes. Besides its use in making candles tallow is most extensively used in the manufacture of soap, and for the purpose of preserving machinery from rust. The trade in tallow with Russia and with N. and S. America, and even with India and other countries, is considerable; but it is declining because of the extension of gas and the enormous development of the Paraffin and Petroleum (q.v.) oils, and other light-giving materials. One of the chief uses of tallow is now in the manufacture of Soap (q.v.); and even in this it has yielded in importance to palm and cocoa-nut oils.

Mares' grease is not nearly so solid as tallow; it is a yellowish-brown grease, imported extensively from Montevideo and Buenos Ayres, where vast numbers of horses are slaughtered for their hides, bones, and grease; it is particularly valuable as a lubricant for machinery, and is employed chiefly for that purpose after much of its stearin has been removed for candle-making. It is said that the name *mares'* grease arises from the fact that in S. America horses are chiefly used alive, while mares are slaughtered as comparatively useless. Goose grease is another soft fat, much valued by housewives for many

purposes, but excepting that it is sold in some districts as a remedial agent, it has no commercial importance. Neats-foot oil is a soft fat procured in the preparation of the feet and intestines of oxen for food as sold in the meat-shops. The quantity obtained is not very great, but it is in much request by curriers for dressing leather. Yolk of egg oil is a hard oil, which, though little known in some countries, is extensively used where eggs are cheap; e.g., in Russia it is manufactured on so large a scale as to supply some of the largest makers of fancy soaps, and it forms the principal material in the celebrated Kazan soap; and certain pomades are made of it which have great reputation and realize very high prices. This oil is not unlike palm oil in color and consistency, but when refined is liquid and has a reddish-yellow color. Its price at Moscow is as high as $2 per lb.

The liquid animal oils are more numerous, and, excepting tallow, are far more important, the so-called fish-oils being the principal. These are whale, porpoise, seal, cod, herring, shark, menhaden, etc. The whales which are pursued for their oil are : (1.) The sperm whale. This huge creature is from 60 to 70 ft. in length, and yields generally from 5,000 to 6,000 gallons of oil. The finest oil is taken from the great reservoir on the head. The oil of this species is all of a quality superior to others, and is known as sperm oil. For the method of procuring this oil, see CACHALOT. (2.) The right whale, which yields by far the largest proportion of whale oil. This, with that yielded by other less important species, is usually called train oil. The term *train* is supposed to be a corruption of *drain*, and applies to the circumstance of the oil being drained out of the blubber; and in this sense it is also applied to sperm oil from the blubber of the cachalot, in distinction from the finer oil from the head matter. The right whale forms the chief object of the northern fisheries, but other species of *Balænæ* are pursued in different parts of the world for their oil : see WHALE.

Among the smaller Cetaceans, the porpoises—called also dolphins ('puffydunters' on the e. coast of Scotland)—and grampuses yield an excellent oil, second only in value to that of regular oil whales.

A large quantity of very valuable oil is obtained from seals, and the seal-fishery as a means of obtaining oil is only second in importance to that of the whale. It is carried on chiefly on the shores of Newfoundland, Greenland, and Labrador. Like the whales, the seals have a thick layer of blubber, in which the oil is contained: see SEAL. The first draining from the blubber is of fine clear pale-straw color; the next, yellow or tinged; and the last is brown or dark. The whale and the seal oils are nearly all used for burning in lamps, and for this purpose they are admirably adapted by their great illuminating power. They are also the best lubricants for machinery.

Of the true fish-oils, that from the cod is of much importance, especially since its medicinal properties were discovered. It is made only from the liver of the fish; and

the attempt to induce a popular belief that the so-called cod-liver oil was different from the ordinary cod oil of commerce was simply a cheat; no difference exists, and the oil is obtained just as good from the oil merchant at a moderate price per gallon as from the empiric at an exorbitant price per pint. Indeed, the purer the oil can be got the better it is in a remedial point of view, notwithstanding the efforts made to convince the public that a certain color is better than any other.

Instead of the old and somewhat rude methods of preparing the oil (see COD-LIVER OIL), much more complete and efficient arrangements are now adopted. The livers, when taken from the fish, are all examined, washed in clean water, and placed in sieves to dry. Thence they are transferred to pans heated with steam, and after being exposed to a gentle heat about three-quarters of an hour the heat is discontinued; and when cold, the oil which has separated is skimmed off and strained through flannel bags into tubs. Here certain impurities subside, and the clear oil is poured off from the dregs, and the contents of numerous tubs are transferred to galvanized-iron cisterns, in which a further settlement takes place. The oil is now ready for the filters, which are made of the strong cloth called moleskin, through which it is forced by atmospheric pressure into the store-tanks, which also are of galvanized iron. Hence it is pumped into the casks for export, which are usually hogsheads, tierces, and barrels. Besides its consumption in lamps, and for medicinal purposes, cod oil is used in making some kinds of soap. Oil is occasionally made from the herring, but not in very great quantities; it, however, forms a commercial article. It is made from the whole of the fish, the smell of which it retains to a very disagreeable extent.

The lightest of all the fixed oils is made from the liver of the common shark; it ranges from specific gravity 0·865 to 0·867. This, and the oil made from the livers of the common skate (*Raia batis*), the thornback (*R. clavata*), and the white skate (*Rhinobatus cerniculus*), are often substituted for the cod-liver oil used medicinally, but have not its valuable properties.

The oil expressed after steaming from the menhaden or bony fish of the Atlantic coast of the United States has acquired much importance in commerce. It is said to be used as an adulterant of linseed oil. Rope-makers and others use it.

Under the name of lard oil large quantities of the oleine of lard have been made of late years in America, and exported. It is a secondary product, arising from the great manufacture of lard stearin for candle-making which has arisen in this country, and is used principally as a lubricant for machinery.

The solid vegetable fixed oils which find a place in commerce are palm oil, cocoa-nut oil, kokum or vegetable tallow, and carapa or carap oil. The palm oil is of bright orange-yellow color and an agreeable violet odor; it is obtained from the not very thick covering of the hard

seeds of the Oil-palm (q.v.). The fruits, when gathered, are shaken out of the clusters, and are laid in heaps in the sun for a short time, after which the natives boil them slowly in water, when the oil separates and is skimmed off the surface, and carried in small quantities to the depots of the traders, who transfer it to casks prepared to receive it on board the ships. The quantity thus collected is enormous. The imports into Britain alone for the five years 1876-80 were as follows, in cwts.: (1876) 879,824; (1877) 897,264; (1878) 670,797; (1879) 881,329; (1880) 1,032,-823. Previous to 1840 the chief use of palm oil was in making soap, but it was about that time found that the palmitin or fat acid of this oil was admirably adapted for manufacture of Candles (q.v.); and since then it has become of much greater importance.

Cocoa-nut oil is a white fat, with the peculiar smell of the kernel; it is made by grinding or pounding the kernel of the cocoa-nut, termed in its dry state *kola*. After it has been boiled in water for a short time, the paste is submitted to great pressure, and a large quantity of milky juice is obtained; this is slowly boiled, and the oil separates and rises to the surface in considerable quantity, and is skimmed off. Twenty ordinary-sized nuts will yield as much as two quarts of oil. This oil is now very largely imported into western countries, and, treated in the same way as palm oil, forms a stearin, which greatly improves that of palm oil when mixed with it in proper proportions; neither does so well separately, and the consumption of cocoa-nut oil has consequently greatly increased. Most of it comes from Ceylon, where the tree is largely cultivated on purpose. The imports to Great Britain (1880) were 318,454 cwts. By far the greater proportion of this vast quantity is used by the candle manufacturers, and the remainder in making common soap, its disagreeable smell preventing it being employed for the better kinds.

Vegetable tallow, or kokum oil, also is used in small quantities by the candle-makers. It comes from Singapore, and is produced from the seed of *Garcinia purpurea*, a species of the same genus with the mangosteen. Another kind of vegetable tallow is made in China, from the seeds of *Stillingia sebifera*.

Carapa, carap, crab, or andiroba oil, is very extensively made in British Guiana and the W. Indies, but it is nearly all used there, either as a pomade for preserving the hair, or as an unguent for rheumatism and neuralgic pains, for which purposes it is said to be very useful: see CARAPA.

The bassia oil is beginning to attract attention in England, and several importations have taken place from India, and some rather large quantities have reached Liverpool from Bombay, under the name Muohwa oil. This oil is of soft, butter-like consistence and yellowish-green color, and is well adapted for soap-making and for machinery grease: see BASSIA.

The liquid vegetable oils are very numerous, and several are of great commercial importance. First in rank is olive oil, made from the ripe fruit of the common olive (*Olea*

Europea). When good and fresh it is of pale greenish-yellow color, with scarcely any smell or taste, except a sweetish nutty flavor, much esteemed by those who use it. The finest qualities are the Provence oil (rare in this country) Florence oil, and Lucca oil. These are used for salads and for cooking. The Genoa is used on the continent for the same purposes; and Gallipoli, which is inferior, constitutes the great bulk of what is exported for cloth dressing, Turkey-red dyeing, and other purposes; the continental soap-makers also employ it extensively. The high price of the best qualities leads to much adulteration with poppy and other oils, but it is generally safe when in the original flasks as imported. The mode of obtaining the finest kinds is by gentle pressure of the fruit. The cake is afterward treated with hot water, from the surface of which an inferior quality is skimmed. The Gallipoli oil is obtained by allowing the olives to ferment in heaps, and then pressing them in powerful oil-presses; the cake or *marc* is then treated with water once or twice, until all the oil is removed; this inferior oil is darker in color, being a yellowish or brownish green. We receive the finest from Italy, and the commoner qualities from the Levant, Mogador, Spain, Portugal, and Sicily.

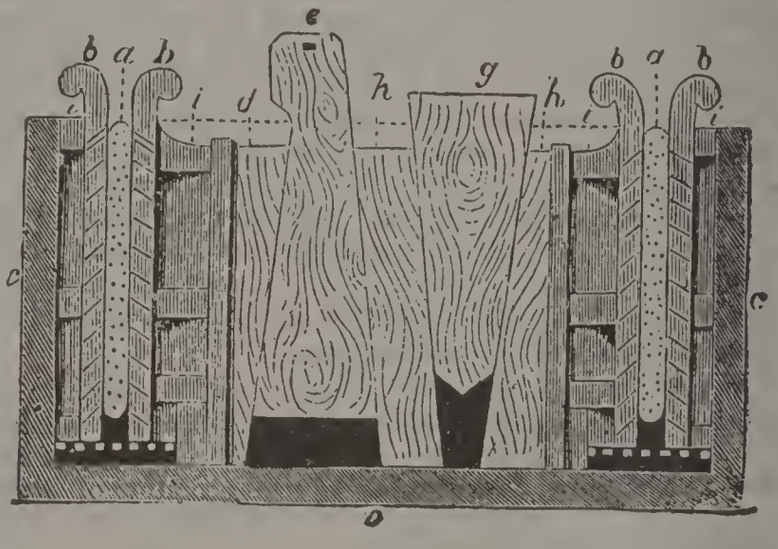


Fig. 1.

Nearly all the other liquid vegetable oils of this class are obtained from seeds, and as they are most of them treated in the same way one description will suffice. First, the seeds are ground—usually by vertical stones (see MILL, fig. 4)—into a kind of coarse meal, which is first warmed in pans, and then put in certain portions in woolen cloths or bags, so arranged as to be of uniform thickness; these are again wrapped in horse-hair cloths, and each parcel is placed between two flat boards slightly fluted on their inner sides, and then placed in the wedge-press (fig. 1). In this *a*, *a* are two flannel bags filled with the meal and inclosed in horse-hair bags, each flattened between the flat boards, *b*, *b*, *b*, *b*. They are set upright between the pressing-plates, *i*, *i*, *i*, *i*, one at each end of the press-frame, *ccc*.

which is made of great strength, and often of cast-iron; its section is seen in fig. 2. Next is placed the wedge *d;* the other wedge, *e*, is then suspended by a cord in the position represented; *h*, *h* are then placed, as seen in the drawing; the main wedge, *g*, is lastly inserted, and the press is ready for action. The operation is very simple; a heavy wooden stamper, 500 to 600 lbs. weight, is raised by machinery about two ft., and allowed to fall upon the wedge *g*. This tightens all the other wedges and pressing-plates, and exerts a pressure of about 60 tons on each bag when fully driven home. The pressing-plates, *i*, *i*, *i*, *i*, are pierced with holes, and so are the plates *b*, *b*, *b*, *b;* and through these holes the oil trickles and passes away by the pipe, *k*, shown in fig. 2.

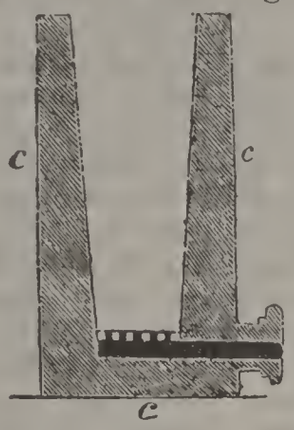


Fig. 2.

One of the chief seed-oils is that of Linseed (q.v.). It is of dark color, specific gravity ·940, boiling point 600° F., and solidifies at a little below 0° F. It possesses the power of dissolving sulphur; on long heating it may dissolve one-quarter its weight, and become thick and dark-colored, forming what has been termed fatty balsam of sulphur. While much oil is made here, about 1,000,000 gallons are imported annually. It is the subject of considerable adulteration, rosin oil being the one perhaps most used. The oil is used in medicine as a laxative. Rape or colza oil is a name which covers the product of several cruciferous seeds, as rape, turnip, and other species of *Brassica*, radish, *Sinapis toria*, gold of pleasure, etc. The oil is clear brown and usually sweet, but with a mustard-like flavor; its illuminating powers are excellent, and it is also well adapted for wool-dressing. Very large quantities are made in Great Britain, chiefly from *Sinapis toria* and other Indian mustard seeds, imported under the name of Surzee seed. The imports of these seeds are occasionally as much as 60,000 quarters per annum. Hemp seed yields a green oil much used in making soft soap, especially in Holland. In Russia it is eaten with various kinds of food, and is greatly liked by all classes.

Cotton-seed oil is now made on an immense scale in the United States. It resembles olive oil, and is used as a substitute for or adulterant of it. It is also employed in the manufacture of soaps, candles, fictitious or vegetable lard, and other varied products. It has acquired a standing such as to raise the waste cotton seed from the gins of the southern states to a most important place in the industrial world.

The following are the names of a number of oils more or less in use. Palm-nut oil, a clear limpid oil from the hard nut of the oil-palm; this nut was formerly rejected as useless after the oil had been obtained from the fruit. Safflower-seed oil, from the seeds of *Carthamus tinctorius;* it constitutes the real Macassar oil. Sunflower

seed oil, from seed exported from the Black Sea provinces of Russia; a rapidly increasing trade is springing up in this excellent oil. Poppy-seed oil, from the seed of *Papaver somniferum*, largely exported from India; it is as sweet as olive oil, and is extensively substituted for it, especially in France, where also it is very largely cultivated. Gingelli-seed oil, from the seed of *Sesamum orientale*, an important Indian staple; the oil is much used for wool dressing, etc. Ground-nut oil, from the seeds of *Arachis hypogæa*, exported from w. Africa and India; this oil is adapted particularly for fine machinery, as it is not affected by cold. Niger, til, or teel-seed oil, from the seeds of *Guizotia oleifera*, much exported from Bombay. Croton oil, from the seeds of *Jatropha curcas*, largely used in wool dressing. The croton oil used in medicine is from *Croton tiglium*, of which only small quantities are exported; whereas of the other many hundred tons, besides seed in large quantity, are exported in one year. Another highly valuable medicinal oil, Castor-oil (q.v.), is of great commercial importance. Almond oil, used chiefly for perfumery purposes, is made from the kernels of the sweet and bitter almond; it is the most free from flavor and odor of any oil in use, notwithstanding that the essential oil of bitter almonds is so strongly flavored.

Oils made from the seeds of the following plants have some commercial value in various countries: *Madia sativa; Argemone Mexicana;* various species of gourds; garden cress (*Lepidium sativum*); tobacco, now extensively used in s. Russia, Turkey, and Austria; hazel-nuts; walnuts; nuts of stone pine; pistachio nut; tea-seed; this in China is a common painter's oil; the grape, from the seeds or stones, as they are called, saved from the wine-presses, used in Italy; Brazil-nut (*Bertholetia excelsa*); *Calophyllum inophyllum*, called Pinnacottay oil in India; *Melia azadirachta*, called in India by the names Neem and Margosa oil; *Aleurites triloba*, called in India, Country Almond oil, and much used for burning in lamps and torches; *Psoralea corylifolia*, called Baw-chee-seed oil. Ben-seeds (*Moringa Pterygosperma*); Bonduc-nuts, the seeds of *Guilandina bonduc* and *G. bonducella*.

The following oils, new to European and American commerce, were shown in the International Exhibition 1862. *India.*—Teorah oil, from the seeds of *Brassica erucastrum;* Capala oil, from the seeds of *Rottlera tinctoria;* Cardamom oil, from the seeds of *Elettaria Cardamomum;* Hidglee Badham oil, from the seeds of *Anacardium occidentale*, or Cashew-nut, now largely cultivated in India; Cassia-seed oil; Chaulmoogra oil, from the seeds of *Hydnocarpus odorata;* Cheerongee oil, from the seeds of *Buchanania latifolia;* Chemmarum oil, from the seeds of *Amoora rohituka;* Circassian-bean oil, from the seeds of *Adenanthera pavonina;* Hoorhoorya oil, from the seeds of *Polanisia icosandra;* Custard Apple-seed oil, from the seeds of *Anona squamosa;* Exile oil, from the seeds of *Cerbera Thevetia;* Monela-grain oil, from the seeds of *Dolichos*

uniflorus; Kanari oil, from the seeds of *Canarium commune;* Khaliziri oil, from the seeds of *Vernonia Anthelmintica;* Malkungunnee oil, from the seeds of *Celastrus paniculatus;* Bakul oil, from the seeds of *Mimusops elengi;* Rana oil, from the seeds of *Mimusops Kaki;* Moodooga or Pulas oil, from the seeds of *Butea frondosa;* Nahor or Nageshur oil, from the seeds of *Mesua ferox;* Hone-seed oil, from seeds of *Calophyllum calaba;* Poonga, Caron, or Kurrmig oil, from the seeds of *Pongamia glabra;* Vappanley oil, from seeds of *Wrightia antidysenterica;* Babool oil, from seeds of *Acacia Arabica;* Gamboge oil, from seeds of the Gamboge-tree (*Garcinia pictoria*); Coodiri oil, from the seeds of *Sterculia fœtida;* Kikuel oil, from the seeds of *Salvadorea persica;* Marotty, Surrate, or Neeradimootoo oil, from the seeds of *Hydnocarpus inebrians;* and Pundi-kai oil, from the nutmegs of *Myristica malabarica.*

From Brazil.—Oils from the seeds of *Feuillea cardifolia, F. monosperma, Anisosperma passiflora, Cucurbita citrullus, Mabea fistuligera, Anda gomesii, Myristica bicuhiba, Carpotroche Brasiliensis, Dipterix odorata, Theobroma cacao, Acrocomia sclerocarpa, Nectandra cymbarum,* and from the fat of the alligator and the tapir, all for medicinal and perfumery purposes; and oils from the seeds of *Œnocarpus Bacába, Œ. patauá, Caryoca Brasiliensis,* and *Euterpe edulis,* used for culinary and lighting purposes.

From British Guiana.—Oil drawn from the stem of *Oreodaphne opifera;* it resembles refined turpentine. Wallaba oil, from the wood of the Wallaba-tree (*Eperera falcata*), medicinal. Other oils have become known at various international exhibitions. For preparation of the essential oils, see PERFUMERY.

While the annual importations of oils into the U. S. vary, those of an average year were: whale and fish oils, 455,865 gallons, value $115.862; other animal oils, 18,490 gallons, $3,677; olive oil, 893,338 gallons, $696,065; other fixed or expressed vegetable oils, 843,837 gallons, $395,490; and volatile or essential oils, 630,232 gallons, $146,481. The exports were: lard oil, 861,303 gallons, $542,897; sperm oil, 98,832 gallons, $69,628; other whale and fish oils, 483,208 gallons, $127,412; all other animal oils, 558,080 gallons, $377,919; cotton-seed oil, 2,690,700 gallons, $1,298,609; linseed oil, 72,451 gallons, $42,759; volatile or essential oils, value, $188,603.

OIL-WELLS: OIL-TRADE: see PETROLEUM.

-OIN, suff. *-oyn:* in *chem.,* bearing a slight resemblance to; distantly connected with.

OINTMENT, n. *oynt'mĕnt* [OF. *oignement,* an anointing, an unguent—from OF. *ongier;* F. *oindre,* to anoint—from L. *ungĕrĕ,* to anoint: F. *oint,* anointed—from L. *unctus,* smeared with oil, anointed]: any soft fatty substance or compound, used for smearing or anointing the body, especially a diseased part.

OIRIR-GAEL: name which, in the early times of Scottish history, was applied to the Gaels of the coasts, in distinction from the Gall-Gael or islesmen. There was long a struggle for superiority between these two races, represented respectively by Somerled of the Isles and the later kings of Man, in which the latter were eventually successful, uniting under one head the dominion of Argyle and the Isles.

OISE, *wâz:* river in France, a chief affluent of the Seine; rising in the vicinity of Rocroy, in the n. of the dept. of Ardennes, and flowing s.w., joining the Seine at Conflans-Sainte-Honorine, after a course of 150 m., for the last 75 of which it is navigable. The fall of the river is very gradual, and its course extremely sinuous. It is connected by canals with the Somme, the Sambre, and the Scheldt, and forms one of the chief commercial routes between Belgium and Paris. It becomes navigable at Chauny.

OISE: department in n. France, bounded e. by the dept. of Aisne, and w. chiefly by that of Seine-Inférieure, which intervenes between it and the English Channel; area, 2,250 sq. m., of which two-thirds are in arable land; pop. (1901) 407,808. The principal rivers are the Oise—from which the dept. derives its name—and its tributaries the Aisne and Therain. The dept. is almost wholly included in the basin of the Oise; and as the course of that river indicates, the surface—consisting for the most part of extensive plains—has a general slope toward the s.w. The soil is in general fertile, and agriculture is well advanced. The products are the usual grain-crops, with an immense quantity of vegetables, which are sent to the markets of the metropolis. The dept. is divided into the four arrondissements Beauvais, Clermont, Compiègne, Senlis; cap. Beauvais.

OITI (*Moquilea tomentosa*): tree of the nat. order *Chrysobalanaceæ*—by many botanists regarded as a sub-order of *Rosaceæ* (q.v.)—native of n. Brazil, and valuable on account of its timber, which is very good for ship-building.

OJIBWAYS, *ō-jĭb'wāz*, or CHIP'PEWAS: tribe of N. American Indians of the great Algonquin family, living in scattered bands on the shores of Lakes Superior and Huron. The French explorers found them on the n. shore of Lake Huron 1640, a band of 2,000 being at Sault Ste. Marie, from which they were called Sauteux, a name they still bear among the Canadian French. Here the Jesuit Fathers established a mission 1642. The O. are a tall, well-developed, brave, hardy people, fond of war and hunting, but little given to agriculture. They have been at war with the Sioux, Iroquois, and Foxes from early times. War so reduced them that on the restoration of the French missions 1660 only 500 O. were found in four bands at the Sault. They were warm allies of the French to the close of French rule. They were allies of the British in the revolutionary war and in the second war with England; but made peace with the Americans by the

treaties of 1785, 89, 95, and 1816. Some had moved as far e. as Lake Erie, but gave up most of their lands in Ohio 1817. In 1822 there were 5,669 O. at Saginaw, 8,335 along the Lake Superior line from Mackinaw to the Mississippi, and 500 mixed with other tribes. The limits of their vast territory were fixed by treaty 1825. They gradually ceded their lands to the govt., and 1837 and 42 the United States agreed to pay them for 25 yrs. $260,200 in money, goods, and other forms. By 1851 all but a few bands had been removed w. of the Mississippi river, while those remaining ceded all except moderate reservations. Their total number 1866 was 14,000, at various stages of civilization and improvement. The Lake Superior and Michigan bands were generally peaceful, industrious, and advancing in cultivation. The Red Lake band were chiefly hunters. The O. of the Mississippi river still possess large tracts of land, and many others are scattered on reservations amounting to more than 5,000,000 acres, as provided by treaties 1854–67. There are also many O. in Canada. The early Rom. Cath. missions are still maintained; there are also Prot. missions. The customs, traditions, language, and religion of the O. are better known than those of any other tribe.

O'KA: important commercial river of central Russia, principal affluent of the Volga from the south. It rises in the govt. of Orel, and flows generally n e., forming a common boundary between the govts. of Tula, Kaluga, and Moscow; and afterward flowing through the govts. of Riazan, Vladimir, and Nijni-Novgorod. It joins the Volga at the city of Nijni-Novgorod, after a course of 837 m. Its basin, estimated at 127,000 sq. m., comprises the richest and most fertile region of Russia. The principal towns on its banks are Orel, Beleff or Bielev, Kaluga, Riazan, and Murom; the most important affluents are the rivers Moscow, Kliasma, and Tzna. During spring the Oka is navigable from Orel to the Volga; but in summer the navigation is obstructed by sandbanks. It communicates with the ports on the Baltic, Caspian, and White Seas; and the cargoes annually shipped down the river amount in value to many millions of dollars.

OKE, n. *ōk* [Turk.]: Turkish and Egyptian weight, equal to about $2\frac{3}{4}$ lbs.: Hungarian and Wallachian measure of capacity, equal to about $2\frac{1}{2}$ pints.

OKEECHOBEE. *ō-kē-chō'bē*, Lake: largest lake in the s. part of the United States: it is in the s. part of Fla., s. of Brevard co. and between Manatee and Dade cos.; greatest length about 40 m., greatest width 25 m.; greatest depth variously stated 12 to 20 ft.; area 1,200 sq. m. It is for the most part inaccessible, owing to the swampy and impenetrable jungle which almost encircles it. It receives the waters of several streams, the Kissimee being the largest, and its waters are doubtless drained into the Everglades to the s., though no outlet has been discovered. But few fish are found. There are several low islands in it, which were formerly said to contain ruined buildings, but that report is not now believed. The lake has recently been partly drained

OKEFINOKEE, *ō-kē-fĭ-nō'kē*, SWAMP: one of the largest swamps in the United States; in Chariton, Ware, and Clinch cos. in s. Ga., and Baker co. in n. Fla.; about 40 m. long, 30 m. wide; 500,000 acres. It has a large extent of heavy forest timber, other portions being partly overgrown with weeds, vines, and bushes. Alligators, rattlesnakes, and moccasins abound, and many species of game birds are found. The e. part is a lake about 12 m. wide, dotted with floating islands or *prairies tremblantes.*

O'KEL'LY, JAMES: 1757–1826, Oct. 26; b. Ireland. His youth is involved in obscurity. He was one of the early Methodist preachers in America, beginning his work in the middle of the revolutionary war. He was admitted into the travelling connection 1778, ordained elder at the organization of the M. E. Church 1784, and was a member of the council of presiding elders at Baltimore 1789, Dec. 1. His opposition to certain measures of the council did much to discredit such bodies; the second called by Bp. Asbury being poorly attended, and the third called was never held. O'K. labored hard for a general conference, and he succeeded in bringing it about. His desire to curtail the power of Bp. Asbury led him to offer a resolution in general conference 1792, that any preacher might appeal from the bp.'s appointment to the general conference. The resolution was lost, and O'K. with a few supporters withdrew from the conference and organized the Republican Methodist Church, afterward called the Christian Church. This secession gained 1792–98 about 8,000 members; but divisions and subdivisions reduced it; and 20 years later little remained of the organization. O'K.'s ministry was mainly in the s. counties of Va. and the border counties of N. C. He was vehemently opposed to negro slavery, protesting against it privately and from pulpit and press.

OKEN, *o'kĕn* (originally OCKENFUSS, *ok'kĕn-fŏs*), LORENZ: famous German naturalist: 1779, Aug. 1—1851, Aug. 11; b. Bohlsbach, Würtemburg. He studied at Würzburg and Göttingen; became extraordinary prof. of medicine at Jena 1807, where his lectures on nat. philosophy, nat. history, zoology, comparative anatomy, vegetable and animal physiology, attracted much notice. In 1812 he was appointed ordinary prof. of nat. science; and in 1816 commenced the publication of a journal partly scientific and partly political, called *Iris*, which continued till 1848. The opinions promulgated in the *Iris* led to govt. interference, and O. resigned his chair and became a private tutor, giving his leisure to the composition of works on nat. history. In 1828, he obtained a professorship in the newly-established Univ. of Munich; but in 1832 exchanged it for another at Zürich, where he died. O. aimed at constructing all knowledge *a priori*, and thus setting forth the system of nature in its universal relations. The two principal works in which this idea is developed are *Lehrbuch der Naturphilosophie* (Jena 1808–11), and *Lehrbuch der Naturgeschichte* (3 vols. Leip. 1813–27). The former has been translated into English, and published by the Ray

Soc. under the title *Elements of Physio-philosophy.* As Oken's philosophic system of nature was very peculiar and quite unlike anything that had preceded it, Oken invented a nomenclature of his own, which, however, in many cases is forced and pretentious, composed of words mostly newly-coined and difficult to remember. It therefore found little favor, and Oken was long regarded—particularly by French and English savants—as a mere dreamer and transcendental theorist; nor can it be denied that he is to a large degree such, infected with the worst vices of the school of Schelling, to which he belonged; but some of his 'intuitions'—if we may so term his scientific suggestions—were remarkably felicitous, and in the hands of rigorous demonstrators, have led to great results. In his work *Die Zeugung* (On Generation, Bamb. 1805), he first suggested that all animals are built of vesicles or cells; in his *Beitrage zur vergleichenden Zoologie, Anatomie und Physiologie* (1806) he pointed out the origin of the intestines in the umbilical vesicle; and in the same year lighted accidentally upon the idea, since so prolific of results, that the bones of the skull are modified vertebræ. On account of this discovery he has been termed 'the father of morphological science.' That Oken, and not Göthe, was the original discoverer of the vertebral relations of the skull has been conclusively shown by Owen, in a valuable notice of Oken in *Encyc. Britannica.*

OKHOTSK, *ō-ċhŏtsk'* or *ŏk-hŏtsk',* Sea of: extensive inlet of the n. Pacific Ocean, on the e. coast of Russian Siberia. It is bounded n. by the wastes of Siberia, e. by the peninsula of Kamtchatka, and is partially inclosed by the Kurile Islands on the s. and by the island of Saghalien on the w. It is 1,000 m. in length, and 500 m. in breadth. The river Ud, which enters it on the n., is 400 m. long. Climate and position will probably prevent the Sea of Okhotsk from ever becoming the scene of much commerce. On its n. shore, at the mouth of the Okhota—from which it derives its name—is the small seaport of Okhotsk, lat. 57° 21′ n., long. 143° 17′ e. (pop. 236): it has been entirely superseded by the ports of Nikolaevsk and Vladivostok.

OKLAHOMA: a state of the United States, in the south central part; bounded on the north by Colorado and Kansas, on the east by Missouri and Arkansas, on the south by Texas, and on the west by Texas and New Mexico. The northern boundary is lat. 37° N., and the point farthest south on the irregular southern boundary, is at 33.6° N. The state lies between long. 94.6° and 103° W. Its extreme length from east to west is about 458 miles, and its width from north to south is about 225 miles. The area of the former territory was 39,030 square miles; of the new state 70,430 square miles. Oklahoma as a territory was originally a part of Indian Territory, was purchased by the United States Government in 1866, was opened to settlement in 1889, and was

organized as a territory 1890, May 2. On 1906, June 13, Congress passed a bill enabling Oklahoma and Indian Territory to join the Union as the State of Oklahoma; the bill was signed by President Roosevelt 1906, June 16; and the state was formally admitted by the President's signature 1907, Nov. 16. (See *History.*) This article, however, in its descriptions of the topography, climate, flora, geology, agrieulture, industries, education, religion, ete., deals only with Oklahoma as a territory before admittance as a state; the government is given as it is according to the first constitution of the new state; and the history is that of the territory only, but including the admission to the Union. Therefore, for area, population, topography, flora, fauna, agriculture, statisties, and history of Indian Territory see that title.

Topography.—The surfaee of the eastern part of the former territory is rolling land; on the east side of the North Fork of the Canadian River, and nearly parallel with the stream, are the Chautauqua Mountains, which are really a chain of hills eomposed of massive gypsum. In the southern part are the Wichita Mountains, a group of granite and porphyry mountains, some of the peaks 1,200 feet from the base. The highest land is in the extreme northwestern part, a portion of the Great Plains which increase in altitude toward the west until they reach the Rocky Mountains. Along the northwest boundary these plains are approximately 3,500 feet in height. The divides extend southeast and northwest; the river basins are long and narrow. The Arkansas River erosses the northeast corner. The Salt Fork of Arkansas River enters from the north, a little west of the centre of the northern boundary, and flows east into the Arkansas. The Cimmarron, whose head-waters are in the northeastern part of New Mexieo, enters from Kansas and flows southeast and northeast and enters the Arkansas on the Indian Territory boundary. The North Canadian, in its upper course known as Beaver River, also rises in New Mexieo and flows southeast entirely across Oklahoma and far into Indian Territory before uniting with South Canadian. The South Canadian enters Day County from Texas, erosses Oklahoma, and flows into the Indian Territory. The Red River forms the southern boundary, and reeeives a number of large tributaries from Oklahoma, principally the Washita and the Salt Fork and the North Fork of the Red.

Climate.—The records for 1892 to 1900 show a maximum temperature of 115° F. and a minimum of 25° F. below zero. In both cases the temperature was remarkably unusual, an extreme. The average for July is 81.2° and for January, the coldest month, 36.9°. The cold season is short. The rainfall is distributed over all the year, averaging 31.7 inches. The rainfall is greater in the eastern part; the smallest amount falls in Beaver County. The rivers tend to inerease the moisture, so that the climate on the whole is suitable for agricultnre in all parts.

OKLAHOMA.

Geology and Minerals.—In the eastern part is the Carboniferous area, as in a large portion of the central part of the United States; the high land of Beaver, Woodward, Day and other western counties in the northwest is covered with Neocene deposits; but the greater portion has a surface rock of red Permian shales and sandstone. In the Wichita Mountains in the southern part are found Silurian strata and Archæan rocks. Coal is found in the eastern part chiefly in the Osage Nation; copper in Beaver County; building stone in most parts, also small amounts of gold, silver, and iron. The most valuable minerals, however, are salt and gypsum, both of which are found in practically inexhaustible quantities. Salt occurs chiefly in the form of brine springs giving rise to extensive salt plains, of which there are seven in Oklahoma. The combined flow from these springs exceeds 10 second-feet. The brine is practically a saturated solution. The Oklahoma gypsum deposits are the largest in the United States, approximating 125,000,000,000 tons. The product occurs either in the form of massive white ledges of rock gypsum, some of which are 200 miles long, others 115 feet thick; or as gypsite, otherwise known as earth gypsum. The greater part of these deposits occur along three rows of gypsum hills which extend northwest and southeast. Cement, stucco, and plaster are manufactured from the gypsum.

Flora.—The timber is found in the east and chiefly near the streams. In 1900 there were 4,400 square miles, or about 11 per cent. of the total area, covered with timber, consisting almost entirely of black-jack and post oak on the uplands, and cottonwood, elm, hackberry, walnut, sycamore, persimmon, hickory, and a few other species along the streams. The western part is almost treeless; various grasses grow wild and numerous flowering plants. The cactus, sage brush, and yucca are occasionally found in the extreme west.

Fauna.—See UNITED STATES; AMERICA.

Agriculture.—The soil of the river valleys is very fertile; it is mixed with a rich black alluvium, making a contrast to the red clay and rock formation of the uplands. Agriculture and stock raising are the natural industries of a region situated as is O. There are about 70,000 farms, their total value, including lands, buildings and improvements, implement and machinery, and live stock, being about $200,000,000. Wheat and corn are the chief products, while hay and grain are very valuable, and cotton almost as much so. Other important crops are vegetables, fruit, tobacco, sugar cane, flowers (plants, seeds, and blossoms), and nursery products. Potatoes, onions, and fruit are receiving especial attention. Dairy produce has also come to form an important item, being worth nearly $8,000,000 annually.

Manufactures.—While O. is an agricultural and stock-raising region, the manufacturing industries are none the less increasing. The chief manufacturing establishments are flour and grist mills, cotton gins, cotton-seed

oil mills, fruit canneries, cracker factories, meat-packing establishments, machine-shops, brick plants, agricultural implement shops, railroad shops, tobacco factories, creameries, salt plants, and cement and plaster mills. The total value of all manufactured products is about $25,000,000.

Transportation and Commerce.—The Atchison, Topeka & Santa Fe Railroad crosses O., and has branch lines entering all the large cities, besides which there are other important railroad lines passing through the state, so that adequate connection is established with the great trunk lines of the country. Altogether there is a total trackage of about 5,600 miles. The rivers are not navigable.

Finance and Banking.—The total assessed valuation of property, including both personal and realty, is $860,000,000, the tax rate is $2.50 per $1,000, and the bonded debt $1,460,000. When O. was organized as a territory there were only three banks within its limits. To-day there are nearly 400 national banks, about an equal number of State banks, and more than 10 private banks. The main sources of income are the rentals of public lands and the general tax.

Education.—A public school system has been established and provisions are made for its maintenance and operation. The income derived from the rental of public lands is mainly devoted to schools; two sections of land in each township have been set apart for the support of schools. Altogether O. spends well over $2,500,000 in maintaining its public schools, in which there are nearly 300,000 pupils enrolled, with nearly 9,000 teachers. The state also has the University of O. at Norman, a Mechanical and Agricultural College at Stillwater, the Northwestern Territorial Normal School at Alva, the Normal School for O. at Edmond, and the colored Agricultural and Normal University at Langston, the Southwestern Normal School at Weatherford, and the University Preparatory School at Tonkawa. Besides these there are private academies and colleges. Indian Schools are supported by the Federal Government. The Chilocco School in Kay county, in the northern part, is for Indian pupils. There are also many boarding schools and mission schools for the Indians, which are run as denominational institutions.

Religion.—The number of church organizations in the State numbers more than 1,500. The leading denominations are the Roman Catholic, Methodist Episcopal, Baptist, Christian, Methodist Episcopal South; and Congregationalists.

Charities and Corrections.—There is an insane hospital at Norman. Deaf mutes are provided for by State funds, but are cared for principally in private institutions. O. has no penitentiary, arrangements having been made with Kansas whereby prisoners are sent to that State.

Government.—The former territory of Oklahoma was

Area in Square Miles, 60,430

Number of Counties, 28

Indian Nations, 6

Population, 790,391

Capital of State, Guthrie

administered under the territorial laws of the United States, but after the admission of Oklahoma and Indian Territory to the Union a new state constitution was adopted at a special eleetion held 1907, Sept. 17. Under this eonstitution the government is vested in a governor elected for four years, lieutenant-governor, seeretary of state, treasurer, auditor, attorney-general, and eommissioner of insurance. The legislature is divided into two chambers, the sessions being biennial and limited to 60 days. There is a supreme eourt with a ehief justiee and six associate justiees, and the usual county, eity, and other eourts. The state has five representatives in Congress and two Senators. The prohibition amendment to the eonstitution was adopted at the special eleetion in 1907. Among the speeial features of the new constitution are the following:

The initiative and referendum is given a prominent plaee in the eonstitution, but the right of reeall usually regarded as praetically a parallel proposition, was rejected. Separate schools for white and negro ehildren are provided; all other raees than negroes being elassed as white. The state is given the right to engage in any business or occupation, but the grant is limited by the qualifieation that it shall be 'for publie purposes.' Trial by jury is granted in eontempt eases for violations of injunctions or orders of restraint, and an opportunity to be heard must be given on all eontempts before punishment is imposed. Three-fourths jury verdicts are provided for in civil eases and eriminal eases less than felony. The grand jury system is not mandatory. Persons are granted immunity from prosecution if their testimony ineriminated themselves. The eontrol of all publie-serviee eorporations is vested in a eorporation eommission of three members, elected by the people for six-year terms. All railroads are deelared publie highways. Publie-serviee corporations and their officials are prohibited from eonsolidating with or owning stoek in any competing eorporation. The eommon law doetrine of fellow-servant was abrogated as to all railroad, street or interurban eleetric lines and mining eompanies, and recovery may be had as fully in eases where death oeeurs as where it does not. Campaign eontributions by eorporations are forbidden, and it was sought to prevent the issuance of watered stoek by providing that no stoek shall be issued exeept for money, labor done or property aetually reeeived to the amount of the par value of the stock.

The territorial governors of Oklahoma were: George W. Steele 1890-2; Abraham J. Seay 1892-3; William C. Renfrew 1893-7; Cassius M. Barnes 1897-1901; T. B. Ferguson 1901-5; and Frank Franz 1905, Jan. 15—1907, Nov. At the election in Sept. 1907, Charles N. Haskell was elected first governor of the new state. The present governor is Lee Cruee.

Population.—The majority of the population, about 95 per cent., are native born Amerieans. The Federal Cen-

sus for 1890 shows a population of 61,834 and for 1900, 398,331. The increase from 1890 to 1900 was more than 543 per cent. The Indian population is in places decreasing or changing but little. In 1900 it was 13,873. The population of the new state at time of admittance was 1,414,177; in 1910, 1,657,155.

The principal cities are Oklahoma, Guthrie, Norman, Enid, Kingfisher, Hennessey, Blackwell, Chandler, Perry, Pawnee, Ponca, Newkirk, Stillwater, Shawnee, Tecumseh, Hobart, Alva, Weatherford, Lawton, and Anadarko. The rapidity of growth of some of the towns and cities has been remarkable, as well as the way in which they came into existence. The site of Thomas, in Custer County, was chosen by persons who went into the territory on an excursion train. The train was stopped when a suitable place was found, and before night it was a good-sized town with a daily newspaper.

History.—The earliest mention of the country included in Oklahoma is that by Don Diego Dionisio de Penalosa, a Spaniard who traveled through this region in 1662. He reported it as 'pleasant and delightful,' far exceeding in beauty 'New Spain.' The Louisiana Purchase of 1803 included all the land now in the territory, except Beaver County, which was originally a part of the republic of Texas. When Texas became a part of the United States, the lands north of lat. 36° 30′ N., the northern boundary of slave territory, were ceded to the United States, and Texas came into the Union as a slave State. Oklahoma was a part of the original Indian Territory (q.v.). The official act whereby this portion of the Reservation has become a home for white settlers, has to do with the third article of the treaty of 1866, June 14 (14 Stats., 786), wherein the Creeks ceded and conveyed to the United States to be used as homes for other civilized Indians an area estimated to contain 3,250,560 acres. The United States agreed to pay the sum of 30 cents per acre amounting to $975,168. When the ceded lands were surveyed and subdivided it was found that the area ceded contained 151,870.48 acres in excess of the estimated amount and Congress, by the act of 1884, July 7 (23 Stats., 212), appropriated money to pay for the excess.

By article 3 of the treaty of 1866 March 21 (14 Stats., 756), the United States ceded to the Seminoles 200,000 acres of the lands obtained from the Creeks under the Creek treaty above mentioned. Under the provisions of the act of 1882, Aug. 5 (22 Stats., 265), 175,000 acres lying east of the line dividing the Creek country purchased from the Creeks for the Seminoles, were also bought from the Creeks for the Seminoles. By the act of 1889, March 1 (25 Stats., 757), the Creeks ceded to the Government 'the entire western half of the domain of the said Muscogee (or Creek) Nation lying west of the division line surveyed and established under' the treaty of 1866, and by the act of 1889, March 2 (25 Stats., 980), section 12, the Seminoles ceded to the Government lands estimated to contain 2,167,000 acres, being the lands ceded to them

by the treaty of 1866. The survey subsequent to the treaty of 1866 showed the lands so ceded aggregated 2,037,414.62 acres. These lands together with cessions from certain other bands constitute what might be termed 'Old Oklahoma.' By section 10 of the Act of 1893, March 3 (27 Stats., 612), the Cherokees ceded to the Government what was then known as the Cherokee Outlet. The lands ceded by the cessions above mentioned and those referred to constitute Oklahoma as it existed when a territory, or until 1907.

Prior to the final settlement granting permission to the 'whites' to secure 'homesteads' or hold farms in Oklahoma, there were various attempts made to obtain forcible possession of the rich agricultural lands. When the Government purchased the land from the Creeks and Seminoles in 1866, it was claimed that the land was needed for the purpose of locating certain Indian tribes and freedmen; but the land was never used for this purpose. Notwithstanding the treaty restrictions concerning the future occupants of the area, the claim was made and extensively circulated that all Indian rights to the land had been extinguished by purchase, and that, in common with all other public land, it was, under the Homestead Act as modified 1879, subject to pre-emption. It was also claimed that the land had been fenced and was occupied by parties who were keeping immense herds of cattle thereon; and that intending settlers desiring homes had stronger claims than the cattle owners. The statement was widely published that the Oklahoma region was unquestionably public land, and an unorganized company of people from the states adjoining the Indian Territory entered the domain 1879, Apr., intending to locate permanently. The president of the United States notified such intruders to withdraw, and in case of their refusal to obey ordered that they be removed. Another proclamation, issued the next year, was followed in a few weeks by an organized colony which left Arkansas City, Kan., 1880, Apr. 13, under the lead of Capt. David L. Payne, selected a location, laid out a town covering six sq. m., and began to build. The following month the company was removed from the territory by United States soldiers. After a brief period of imprisonment, Payne and his men were discharged and warned not to repeat the offense for which they had been committed. A few weeks later Payne and a still larger party were arrested on the forbidden ground, and treated as the previous party had been. Still another party, numbering about 200, with the same leader, prepared to enter the region in the winter of 1880-81, and was disbanded by United States troops. Payne was tried on a civil process 1881, and convicted. But the laws punished the crime only by a fine, which in this case, as it could not be collected, had no terrors for the offender. Several other expeditions, led by Payne, entered the region and were promptly expelled, but the number and enthusiasm of the invaders steadily increased. Surveys were made,

town lots were laid out, and in the aggregate large sums of money were paid to Payne and other leaders of the movement. Certificates purporting to give the holder a legal claim to 160 acres of land in Oklahoma were sold to many people who did not design to locate there, but who purchased shares merely as an investment. Another class of certificates entitled the purchaser to certain rights in the organization of the government of the colony of which he was a member. After the death of Payne 1884, Nov. 28, the invasions were continued under the lead of W. L. Couch. An armed force defied the government officials; but was expelled 1885, and the leaders were arrested on a charge of insurrection; but the case against them was never brought to trial. Although the president issued a proclamation 1885 to the effect that the government would maintain the position already taken in regard to the settlement of the disputed area in the Indian Territory, incursions continued with considerable frequency till 1887. Meanwhile action had been taken by congress with a view to arrange with the Indians for the opening of the unoccupied lands for settlement under the Homestead Act. Terms were at length agreed on, and early in 1889 treaties were concluded with the interested tribes. A proclamation was then issued by the president, stating the bounds of the new territory which was to be established, and declaring that 1889, Apr. 22, at noon, the unassigned lands would be open for settlement. Any person locating upon the territory before that date was to be debarred from ever acquiring a title to the land. Four days before the date of opening the lands, people were allowed to cross the Cherokee outlet. Vast crowds collected near the Oklahoma boundary, and when the pre-arranged signal of a bugle blast was given they rushed across the line. During the next few hours more than 50,000 people entered the territory, several towns were laid out, and thousands of tents and portable houses were erected. The laws concerning the securing of homesteads had been arranged by congress 1889, Mar. 2, to facilitate the entering of claims, land offices had been opened, and a government force of infantry and cavalry had been detailed to keep order and prevent the intrusion of parties before the appointed hour. The bringing of intoxicating liquors into the Indian Territory had been strictly prohibited, and the order was rigidly enforced. Though wild and impetuous, the entrance into the region was almost wholly free from the quarrels and bloodshed which had been feared. The civil government of the territory was vested in the United States court, which had jurisdiction over the Indian Territory. In several of the principal settlements, municipal organizations were formed, officers elected, and arbitrators chosen to act in place of courts till the latter could be legally constituted. In less than six months from the opening of the region to settlement, the town of Guthrie had six banks, one of which commenced doing business in a tent on the first afternoon

the territory was opened, four daily newspapers, a system of water-works, and both electric light and street car companies. Before 1890, Jan., there had been established in Oklahoma 38 churches, 29 schools, and 22 newspapers. There were 28 towns, of which the larger were Guthrie (pop. 8,000) and Oklahoma City (pop. 5,000). A bill to establish a territorial government was considered in the senate 1890, Feb. 5, passed the house Mar. 13, and the act was approved by the president May 2. The president appointed George W. Steele of Ind. governor of the territory May 8, and the appointment was confirmed by the senate May 14.

The crop failure the first year after organization was a check to Oklahoma. Congress sent aid and the railroads loaned to the settlers, without interest 25,000 bushels of seed wheat. The cession and purchase of the different tracts of land added to Oklahoma have already been mentioned. Greer County in the southwest, which had been in dispute between the Federal Government and Texas, was added to Oklahoma in 1896. The Kiowa, Comanche, and Apache and Wichita reservations were opened for settlement in 1901, July. The Fort Sill Military Reservation, 60,000 acres, is southeast of the Wichita Mountains and in Comanche County. In 1891 Congress was petitioned to admit Oklahoma as a state, and in 1903 another attempt was made to obtain statehood, but nothing definite was accomplished until 1906.

By Chapter 3,335 of the Statutes of the United States, passed at the first session of the Fifty-ninth Congress, and approved 1906, June 16, it was provided that the inhabitants of the Territory of Oklahoma and of the Indian Territory might adopt a constitution and become the State of Oklahoma on complying with the following requirements: They shall vote for and choose delegates to a constitutional convention, at an election ordered by the governor of the Territory of Oklahoma and the senior judge in service in the United States Courts in the Indian Territory jointly, sixty days prior to said election and within six months after the approval of this act. The delegates so elected shall meet at Guthrie, Oklahoma, on the second Tuesday after their election, and proceed to form a constitution and state government for said state. Said constitution shall be submitted to the people for ratification or rejection at a time designated by said convention. It shall be the duty of the President of the United States within twenty days after the receipt of the certificate of the result of such election, if said constitution shall have been ratified, to issue a proclamation announcing the result, 'and thereupon the proposed State of Oklahoma shall be deemed admitted by Congress into the Union, under and by virtue of this act, on an equal footing with the original states.'

The election of delegates to the constitutional convention under this act was held on 1906, Nov. 6. The constitutional convention, which was composed of 112 delegates—55 each from Oklahoma and Indian Territory and

two from the Osage Indian Reservation— met at Guthrie 1906, Nov. 20, and after a session of four months formed a state constitution which was submitted to the people 1907, Sept. 17, and was adopted by an overwhelming majority.

The President of the United States signed the constitution of Oklahoma 1907, Nov. 16, and issued a proclamation announcing its admission as a state into the Union.

Oklahoma numbered 46 in the list of states to enter the union, with population of 1,414,177, which gave it the distinction of having the largest population of any of the commonwealths at the time of assuming state relations. Its area in square miles is 70,430, which is a trifle larger than the combined areas of New York, Connecticut, Massachusetts, and New Jersey. No single state east of the Mississippi has an area equal to that of Oklahoma.

The bill of admission provided that the city of Guthrie should be the capital until 1913, but no money was to be expended on permanent state buildings until a definite location for the seat of government had been selected. At the time Guthrie had a population of 22,000, with modern well-paved streets, a new waterworks system costing $30,000, a $250,000 government building, a $40,000 union railroad station, a new high school building, and numerous modern hotels, factories and institutions of various kinds. Oklahoma City, however, was the largest town in the state, having a population of over 30,000 and more than three miles of handsome business blocks, with other improvements usually found in first-class American cities. The admission of Oklahoma conferred full citizenship upon the tribes of Indian Territory.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE: founded in 1891 at Stillwater. Its regular courses, for completion of which the degree of B.S. is conferred, include general science and literature, agriculture, mechanical engineering, chemistry, and biology; shorter courses are offered in agriculture, horticulture, mechanic arts, printing, and stenography and typewriting; there is also a preparatory department with a two-years' course. Women are admitted to the college, and there are also women on the faculty. The college receives the greater proportion of its income from the Federal appropriation provided for by the law of 1890, and from territorial appropriation; tuition is free. The students number over 300 and the faculty 20.

OKLAHOMA CITY: Oklahoma, city and county seat of Oklahoma co., located on the north fork of the Canadian River. Its railroad connections are the Atchison, Topeka & Santa Fé, the Choctaw, O. & G., the St. Louis & Santa Fé, the Oklahoma City and Western, the Mo., Kan. & Oklahoma, the Texas & Oklahoma, Ok. Terminal, and Oklahoma City & N. I. It is about thirty miles s. of Guthrie, and was settled in 1889, April 22, by 3,000 men who came from the territory line on railroad trains

and on horseback as soon as the proclamation was issued declaring the country open to settlement. It was incorporated as a town, 1890, July, and chartered as a city the following April. The city is the commercial and industrial centre of a very productive agricultural and stock-raising section, and it has a large number of wholesale houses which have more than 1,500 employés. The chief manufactories are cotton mills, flour mills, breweries, box and cracker factories, patent medicine establishments, iron works, soap factories, wood-work shops, and other industries, the whole employing nearly 3,000 persons. The railroads have 1,100 employés who are residents of the city. The grain, cotton and live stock produced in a large section of surrounding country are mostly shipped from Oklahoma City to eastern, northern, and southern markets. Among its schools are the Epworth University, Sisters of Mercy College for Girls, and the Oklahoma Military Institute. It has also very fine systems of public and parish schools, and a Carnegie free library. All the leading religious denominations are represented by substantial church buildings. Sacred Heart Abbey and Saint Anthony's Hospital are also located here. There are eight banks in the city with a combined capital of about $1,000,000. The government is vested in a mayor and council of 10 members elected every two years. The city owns and operates its waterworks. The population is almost entirely American-born white people, about two per cent. being negroes and three per cent. Indians. Population (1890) 4,151; (1900) 10,037; (1903) 12,000; and in 1906, June 16, when the territory was admitted as a state the population of Oklahoma City was estimated at 30,000. Pop. (1910) 64,205.

OKLAHOMA, University of: the State University opened in 1892 at Norman. Its departments include (1) the College of Arts and Sciences, which offers beside the regular collegiate courses a combined collegiate and medical course, and collegiate and engineering course; (2) the School of Pharmacy; (3) the School of Fine Arts; (4) the preparatory department; (5) School of Medicine; (6) School of Applied Science; (7) School of Music. The collegiate department confers two bachelor degrees, A.B. and B.S. The university is coeducational, and women are members of the faculty. It is supported mainly from the income of lands reserved and an annual territorial tax; tuition is free to residents of Oklahoma; in 1905 the income amounted to $70,000. The students in attendance that year numbered over 600, and the faculty 36. The bill providing for the admission of Oklahoma as a state allots 250,000 acres of land for the university. One-third of Section 13 in the new state is apportioned to the university and the university preparatory school.

OKRA, n. *ō'kră*, and Okro, n. *ŏk'rō:* a plant of the W. Indies, whose pods are used as pot-herbs and for pickles; the *Abelmos'chus esculen'tus*. See Hibiscus.

OKUBO, *ōk'ô-bō*, Toshimichi: Japanese reformer and statesman: b. in the province of Satsuma 1829; d. Tokyo 1878, May 14. He displayed from childhood evidences of great ability. He was special adviser of the Prince of Satsuma, who was the great exponent of the restoration of the Mikado to supreme power. His political sagacity was amazing. From the first he penetrated the designs of Russia in the Far East and for this reason, after his return from Europe in 1872 he opposed the war with Korea, knowing that temporary success, before Japan was modernized, would simply be playing into Russia's hands. It was Okubo's manifesto in 1868 that brought the Mikado from palace seclusion behind the screen of mystery into public life, and removed the capital to Tokyo. From 1870 until his death he was the most powerful minister in the imperial cabinet, and the personification of energy and progress. As special envoy to China in 1874, he settled the Formosan episode. The suppression of the Satsuma Rebellion in 1877 settled Okubo's policy as the permanent one for Japan. He was assassinated 1878, May 14, but received posthumous honors from the emperor. Consult his life by Maurice Courant (Paris 1904).

OKUMA, *ŏk'ô-mâ*, Shigenobu, Count: Japanese statesman: b. Sago, Hizen Province, 1838. Count Okuma is one of Japan's most able statesmen, and until his resignation of the leadership of the Progressives in 1907, was the most influential party leader in the country. Okuma in his early youth endeavored to acquire a knowledge of Western learning and went to Nagasaki for purposes of such study. Towards the end of the Shogunate régime, he made many friend at the Imperial Court and shared with them in the great work of making the new Japan. Soon after the Restoration, Okuma was appointed a councillor of state and a commissioner in reference to foreign affairs. Thus he was among the first to become an important official in the new government. He was made senior vice-minister of finance in 1869 and four years later installed as full minister. Okuma was practically in charge of the treasury of the imperial government during its organization period, displaying extraordinary ability in securing the financial stability of the country. He was also foremost in helping the development of the railways, telegraphs and other great undertakings. In 1881 he petitioned the government to establish a national assembly by popular election. This remarkable petition was rejected by his colleagues and he consequently left the government, resigning the office of finance minister which he had held for nearly 10 years. In the following year he formed the famous Kaishinto, forerunner of the present Progressive Party, and strongly attacked the government for its monopoly of power. Shortly after his elevation to the rank of count the turn of events forced him to re-enter the government in 1888 as foreign minister. He

then attempted to undertake the important task of revising the treaties with foreign powers concluded before the Restoration. But his attitude in the negotiations, especially in regard to the clause in the draft treaty for appointing foreign judges as assessors in the supreme court, evoked much public discontent. One fanatic actually threw a bomb at his carriage and the count only escaped with the loss of a leg.

He resigned his cabinet portfolio in a year, but in 1896 he was again head of the foreign office and also minister of agriculture and commerce. Two years later he formed a coalition ministry with the Liberal Party, himself holding the offices of premier and minister of foreign affairs. But owing to dissension between the Liberals and his own party, his cabinet was in office only three months. This ended the count's official career, though he continued in the leadership of the Progressive Party until 1907. He resigned this leadership in his own words, disgusted with the continuous disagreements in the rank of the party. Count Okuma is president of Waseda University which he established in 1882. This is one of the best-known educational institutions in the country. The count is the holder of the First Class of the Order of the Rising Sun, together with many other decorations, Japanese and foreign.

-OL, suff.: in *chem.*, suffix terminating compounds which are true alcohols; thus phenol, phenylic alcohol.

OLAF, *ō'lâf*, SAINT: one of the most revered of the early Norwegian kings: 995-1030 (reigned 1015-30). Having distinguished himself by gallant exploits, and made his name a terror in several warlike expeditions on the coasts of Normandy and England, he succeeded 1015 in wresting the throne of Norway from Eric and Svend Jarl. The cruel severity with which he endeavored to exterminate paganism by fire and sword alienated the affection of his subjects, many of whom sought security from his persecution in the territories of Knut or Canute the Great, King of Denmark; and it was only through the powerful aid of his brother-in-law, the Swedish Anund Jacob, that his authority could be upheld. Olaf's hot-headed zeal, however, after a time exhausted the patience of the people, who hastened to tender their allegiance to Knut, on his landing in Norway 1028, when Olaf fled to the court of his brother-in-law, Jaroslav of Russia, who gave him a band of 4,000 men, at the head of whom he returned 1030 and gave Knut battle at Stiklestad, where Olaf was defeated by the aid of his own subjects and slain. The body of the zealous king, which had been left on the field of battle and buried on the spot by a peasant, having (as was believed) begun to work miracles, his remains were carefully removed to the cathedral of Trondhjem, where the fame of their miraculous power spread far and wide, attracting pilgrims from all parts of the Scandinavian peninsula. Olaf was solemnly proclaimed patron saint of Norway in the suc-

ceeding century; and till the Reformation his name continued to gather a rich assemblage of mythical legends and popular sagas, the memory of which still lingers in the folk-lore of Norway. In 1847 the order of Olaf was created, in honor of the saint, by King Oscar I. of Sweden and Norway.

O'LAND. See Œland.

OLATHE, *ō-lā'thē*: Kan., city, county-seat of Johnson County; on the Atchison, T. & S. F., the St. Louis & S. F., and the Missouri, K. & T. R.R.'s; about 20 miles southwest of Kansas City. It is in an agricultural and stock-raising region. The chief manufactures are flour, furniture, shoes, brick, and agricultural implements. The state institution for the Deaf and Dumb is located here. The city owns and operates the waterworks. Pop. (1910 est.) 3,600.

OLBERS, *ōl'bĕrss*, Heinrich Wilhelm Matthias: famous German physician and astronomer: 1758, Oct. 11—1840, Mar. 2; b. Arbergen, a small village of Bremen. He studied medicine at Göttingen 1777-80, and commenced practice at Bremen, where, both as physician and as man, he was highly esteemed. In 1811 he was a successful competitor for the prize proposed by Napoleon for the best 'Memoir on the Croup.' Olbers wrote little on medical subjects; for from 1779 all the leisure which he could abstract from professional occupations was given to enthusiastic study of astronomy. The first thing which brought him into notice was his calculation of the orbit of the comet of 1779, performed by him while watching by the bedside of a sick patient, and was found surprisingly accurate. Comets were the chief objects of his investigation, and he seems to have had an irresistible predilection for these vagabonds of the solar system, which his two important discoveries of the planets Pallas (1802) and Vesta (1807) could not diminish. In 1781 he had the honor of first rediscovering the planet Uranus, which had previously been supposed, even by Herschel himself, to be a comet, and which had been sought for in vain. He also discovered five comets in 1798, 1802, 04, 15, and 21, all of which, except that of 1815 (hence called *Olbers' comet*), had been some days previously observed at Paris. His observations, calculations, and notices of various comets, which are of inestimable value to astronomers, were published in the *Annuaire of Bode* (1782-1829), in the *Annuaire of Encke* (1833), and in three collections by the Baron de Zach. Most of these calculations were made after a new method, discovered by himself, for determining the orbit of a comet from three observations: a method which for facility and accuracy he considered greatly preferable to those then in use. A detail of it appeared in a journal published at Weimar (1797), and a new edition by Encke 1847. Olbers was one of that small

band of astronomers which included Schröter, Gauss, Piazzi, Bode, Harding, etc., who in the first ten years of the 19th c. devoted their energies to the observation of those planets which were coming to light between Mars and Jupiter. As above stated, two of them, the second and fourth in order of discovery, were detected by Olbers himself; and the general equality of the elements of the four planetoids led him to propound the well-known theory that these and the other planetoids (q.v.) since discovered are but fragments of some large planet which formerly revolved round the sun at a distance equal to the mean of the distances of the planetoids from the same luminary. It was this theory which led him, after the discovery of Pallas, to seek for more fragments of the supposed planet, a search resulting in the discovery of Vesta. Olbers also made important researches on the probable lunar origin of meteoric stones, and invented a method for calculating the velocity of falling stars. He died at Bremen; and 1850 his fellow-citizens erected a marble statue in honor of him. Olbers, as a writer, had great powers of thought, with equal clearness and elegance of expression. His valuable dissertations are scattered through various journals.

OL'COTT, Henry Steel: American theosophist: b. Orange, N. J., 1832, Aug. 2; d. Adyar, India, 1907, Feb. 17. He was educated in the University of the City of New York and in 1858-60 was agricultural editor of the New York *Tribune*. In 1863-6 he was special commissioner in the United States War and Navy departments and was admitted to the bar in 1866. He was one of the founders in 1875 of the New York Theosophical Society, and was its president; he edited the magazine *Theosophist* from 1879, and in recognition of his services to Hindu philosophy received the unique honor of the sacred thread of the Brahman caste. He published: *Sorgho and Umphee* (1857); *People from the Other World* (1875); *The Buddhist Catechism* (1882); *Old Diary Leaves* (1895-1903); etc.

OL'COTT, Simeon: 1735, Oct. 1—1815, Feb. 22; b. Conn.: lawyer. He graduated at Yale College 1761; settled in Charlestown, N. H.: became chief-justice of the common pleas court 1784, judge of the superior court 1790, and chief judge of the latter 1795; and was U. S. senator 1801-5.

OLD, a. *ōld* [AS. *cald;* Ger. *alt;* Goth. *altheis*, old; radical meaning probably *grown up*—from Goth. *alan;* Icel. *ala;* L. *alĕrĕ*, to nourish]: far advanced in years; aged; used of any length of time, as how *old* is he? he is two years *old;* decayed or injured by time or long use; out of date; not new or fresh; in OE., more than enough; superabundant. Old'ness, n. *-nĕs*, state of being old. Old'ish, a. *-ĭsh*, rather old. Olden, a. *ōld'ĕn*, applied to time long past; ancient. Old-fash-

IONED, a. antiquated; formal. OLD AGE, decline of life; advanced years. OLD-CLOTHESMAN, a man who collects half-worn-out garments, and old attire of all kinds, to be sold when repaired and renovated. OLD MEN'S WORKINGS, mines or underground excavations that have been formerly worked. OF OLD, long ago; in anc. times. OLD BACHELOR, an unmarried man somewhat advanced in years. OLD MAID, an unmarried woman no longer young. OLD SAID, long since said. OLD SCHOOL, a party belonging to a former time, or a party having the character and opinions appropriate to former times. OLD SONG, a mere trifle; a nominal price. OLD WIFE, a prating old woman; a man having some of the characteristics and habits peculiar to old women; in *Scot.*, an apparatus for curing smoky chimneys. OLD RED SANDSTONE, the whole series of strata below the Coal-measures and above the Silurian system. OLD TESTAMENT, the earlier portion of the Scriptures, B.C. OLD STYLE, the old mode of reckoning time according to the Julian year of 365¼ days—by the New or Gregorian Style, the year is 365 d. 5 h. 49 m.; there is now a difference of 12 days between New and Old Styles—thus, while the former is Jan. 13, the latter is only Jan. 1. OLD TOM, a kind of strong London gin; a particular manufacture of Scotch whisky, matured by long keeping. OLD WORLD, Europe, Asia, Africa, as distinguished from America or the New World.—SYN. of 'old'; ancient: antique; antiquated; aged; elderly; obsolete; pristine; original; primitive; old-fashioned.

OLD ACADEMY: the title of the school which first developed Plato's philosophy as a system. Special emphasis was given to its ethical bearings.

OLDCASTLE, *ōld-kăs'sl*, Sir **John**: died 1417: formerly known as the 'good Lord Cobham'; whose claim to distinction is that he was the first author and the first martyr among the English nobility: b. in the reign of Edward III.: the year is not known. He acquired the title Lord Cobham by marriage. He had high repute as a soldier, was a personal friend of Henry IV., and commanded the Eng. army in France 1411 which forced the Duke of Orleans to raise the siege of Paris. He was ardently attached to the doctrines of Wickliffe. At that time there was a party among the English nobles and gentry sincerely and even strongly desirous of ecclesiastical reform—the leader of which was 'old John of Gaunt—time-honored Lancaster.' O. was active in the same cause, and took part in the presentation of a remonstrance to the English commons on the subject of the corruptions of the church. At his own expense he had the works of Wickliffe transcribed and widely scattered among the people, and paid a large body of preachers to propagate the views of the reformer throughout the country. In the reign of Henry V. O. was accused of heresy and of harboring the 'poor preachers' or Lollards (q.v.); and having in a disputation with his sovereign declared that, 'as sure as God's word is true, the pope is the great Antichrist foretold in Holy Writ,' he was thrown into the Tower, whence, after some time, he escaped, and concealed himself in Wales. He had indeed publicly refused his assent to the doctrine set forth by the church on the Eucharist, penance, image-worship, and pilgrimages. The king had in vain urged him to save himself by recanting, and at last permitted the bishops to proceed against him. A bill of attainder was passed against him, and 1,000 marks set upon his head. After four years' hiding he was captured, brought to London, and—being reckoned a traitor as well as a heretic, for at his escape the Lollards had risen in revolt—he was hung up in chains alive upon a gallows, and, fire being put under him, was slowly burned to death 1417. O. wrote *Twelve Conclusions addressed to the Parliament of England*, several monkish rhymes against 'fleshlye livers' among the clergy, religious discourses, etc. The severe morality and the anti-ecclesiasticism of O. drew on him the popular contempt; and the idea of Gairdner, advocated by Halliwell and others, that Sir John O. was the original of Shakespeare's Sir John Falstaff, has much probability.

OLD CATHOLICS: title assumed by a number of members of the Church of Rome who, at Munich, protested against the new dogma proclaimed by the Vatican Council, 1870, July 18, of the personal infallibility (see INFALLIBILITY) of the pope in all *ex cathedrâ* deliverances: and now designating a communion or church, in Germany and Switzerland, not large in numbers, but comprising some men eminent in Christian scholarship. The Munich protest by 44 professors, Dr. Döllinger (q.v.) and Prof. Friedrich (q.v.) at their head, was directed against the binding authority of the Vatican Council and the validity of its decrees. To the Munich protest a number of Rom. Cath. professors at Bonn, Breslau, Freiburg, and Giessen declared their adhesion. The leaders of the movement met at the end of Aug. at Nuremberg, and drew up a declaration. The German bishops, though they had given warning of the dangerous consequences of the proclamation of the new dogma, submitted to the decision of the Vatican Council; and in a pastoral letter 1870, Sep. 10, called on all members of the faculty of Rom. Cath. theology to signify their allegiance. Against the refractory (numerous professors and one priest) they proceeded by suspending them from their functions, and then by excommunication. The Prussian and Bavarian governments, however, took their respective subjects, the objects of those measures, under their protection.

At first, the mass of the priests and laity showed very little sympathy with the Old Catholic movement: only two country congregations declaring their dissent from the decree of the Vatican Council. Pamphlets and appeals, issued by the heads of the party, elicited little response. Local committees in furtherance of the cause were, however, formed in towns of Bavaria and the Rhine country. At a general Old Catholic Congress, Munich, 1871, Sep., it was resolved to draw the bonds of union close with the church of Utrecht, the Jansenists (q.v.) of the Netherlands, a church originating in the 18th c., and which, under an abp. of Utrecht and two bishops of Haarlem and Deventer, now offered to the O. C. the possibility of prelatical consecration and confirmation. The congress, while carefully eschewing any decided breach with traditional dogma, and professing the desire simply to maintain the church as it stood before 1870, July 18, propounded the far-reaching principle, that the decisions of an ecumenical council, to be valid, must be in agreement with the existing faith of the Catholic people and with theological science. The hope also was expressed of a reunion with the Greek Oriental Church, and a gradual understanding with the Protestants. Old Catholic congregations began to be formed in different towns of Bavaria and the Rhine country. In 1872, the Old Catholic priests in the German empire numbered about 30. The abp. of Utrecht, in July, made a tour in Germany, holding religious service in Prot. churches and confirming the children of O. C. At a second congress at Cologne 1872, Prof. Friedrich declared that the Old Catholic movement

was now directed, not merely against papal infallibility, but 'against the whole papal system, a system of errors during a thousand years, which had only reached its climax in the doctrine of infallibility.'

At Cologne, 1873, Prof. Reinkens of Breslau was elected bp. of the Old Catholics in the ancient fashion, by 'clergy and people'—by all the Old Catholic priests and a deputation of the Old Catholic congregations. He was consecrated at Rotterdam by the bp. of Deventer; and formally acknowledged by the govts. of Prussia, Baden, and Hesse. The Bavarian govt. declined to forbid his journeys for confirmation in their kingdom. The third congress, at Constance, 1873, concerned itself with 'synodal and communal regulations,' and with projects toward union with other Christian confessions. There were numerous guests present, Anglican, Russian, and German Prot. clergy. On the basis of the decrees of this congress, the first Old Catholic Synod was held at Bonn, 1874, of 30 priests and 59 laymen. They laid down principles for reforms in general, abolished auricular confession and compulsory fasting, and appointed two commissions to draw up a new ritual in the popular tongue and to frame a Catechism and a Bible History.

In Switzerland the Old Catholics, or as they there preferred to style themselves, Christian Catholics, chose Professor Herzog for their bishop and he was duly consecrated by Bishop Reinkens 1876, Sept. 18. The University of Bern elected an Old Catholic faculty and in 1890 there were 55 congregations under Bishop Herzog with some 50,000 lay members and 72 ministering clergymen. In Austria the Old Catholics organized themselves in 1888 and in 1900 were reported to number 16,000 souls. In France a Gallican Old Catholic movement was set on foot by Père Hyacinthe under the jurisdiction of the Arminian archbishop of Utrecht. The Old Catholics in Italy were led by Count Campbello, those in Spain by Cabrera and in 1890 and 1892 there was an enthusiastic international Congress of Old Catholics in which the progress of the movement was said to show a marked advance. On the death of Bishop Reinkens in 1896, Vicar-General Theodor Weber was elected to take his place and consecrated in Bonn with a jurisdiction extending over the whole German Empire. In this large diocese, the whole of Germany, the Old Catholics number 61 priests (four of them retired and two holding professorates), and from 45,000 to 50,000 lay members; and are building numberless churches, parsonages, and seminaries. At Bonn and Essen they have founded hospitals and poorhouses. The Church has several organs, the chief of which are *Deutscher Merkur*, published at Munich since 1870 and at Bonn since 1899; *Alt-Katholisches Kirchenblatt*, founded in 1874. In Holland, it is represented by *Oud Katholik;* in Italy by *Il Labaro;* in Spain by *La Luz.* Its quarterly review of theology (a scientific and learned volume of essays and notes) is the *Internationale Theologische Zeitschrift*, founded in 1893.

Consult: Goetz, *Die geschichtliche Stellung und Ausgabe des deutschen Alt-Katholicismus* (1896); Mayor, *Facts and Documents* (1875); and Mullinger ('Theodorus'), *The New Reformation.*

OLD COLONY: a name applied to the southeast part of Massachusetts, the section occupied by the Plymouth Colony, and later given to the state.

OLD CURIOSITY SHOP: a novel by Charles Dickens which first appeared by weekly instalments in *Master Humphrey's Clock* 1840-1. Little Nell, Dick Swiveller, Quilp, and The Marchioness are prominent members of the *dramatis personæ.*

OLD DOMINION: a name given to Virginia. In the original charters pertaining to the lands of Virginia, it was frequently called "the colony and dominion of Virginia.' Massachusetts was given the name 'Old Colony,' and Virginia 'Old Dominion.'

OLDEN, *ōld'ĕn,* CHARLES SMITH: 1799, Feb. 19—1876, Apr. 7; b. Princeton, N. J.: merchant. He received a limited common school education; began his mercantile career in Philadelphia 1823; was successfully engaged in business in New Orleans from 1826 till 1834; and then retired to his home in Princeton. He became treasurer of the College of New Jersey and rendered it large service after the burning of Nassau Hall; was a state senator from 1844 till 1850; was elected governor of New Jersey as a republican 1859; was active in organizing and equipping troops for the Union armies, attended the peace congress 1861, and served as governor till 1863, and subsequently was a judge of the court of errors and appeals, member of the court of pardons, riparian commissioner, and presidential elector.

OLDENBURG, *ōl'dĕn-bĕrg,* Ger. *ōl'dĕn-bûrch:* grand-duchy of n. Germany, consisting of three distinct and widely separated territories, viz., Oldenburg Proper, the principality of Lübeck, and the principality of Birkenfeld; total area, 2,461 sq. m.; pop. (1900) 399,180. Oldenburg proper, which comprises seven-eighths of this area and four-fifths of the entire population, is bounded n. by the German Ocean, e., s., and w. by the kingdom of Hanover. The principal rivers are the Weser, the Jahde, and the Haase, Vehne, and other tributaries of the Ems. The grand-duchy of Oldenburg Proper is divided into eight circles. The country is flat, belonging to the great sandy plain of n. Germany, and consists mostly of moors, heaths, marsh or fens, and uncultivated sandy tracts. Agriculture and the rearing of cattle are chief sources of wealth. Except some linen and stocking looms, and a few tobacco-works, there are no manufactories. There are, however, numerous distilleries, breweries, and tan-yards in all parts of the duchy.

The principality of Lübeck, consisting of the secularized territories of the former bishopric of the same name, is surrounded by the duchy of Holstein, and is on the banks of the rivers Schwartau and Trave; con-

tributing 199 sq. m. to the general area of the grand-duchy, and 34,961 inhabitants to the collective population. It is divided into four administrative districts. It has several large lakes, as those of Plön—noted for its picturesque beauty—Keller, Uklei, and Gross-Eutin; while in climate, soil, and natural products it participates in the general physical characteristics of Holstein. The chief town is Eutin, situated on the lake of the same name.

The principality of Birkenfeld, s.w. of the Rhine, among the Hundsrück mountains, and between Rhenish Prussia and Lichtenberg, is an outlying territory, lat. 49°30′—49°52′ n. and in long. 7°—7°30′ e.; 192 sq. m.; pop. 37,093. The soil of Birkenfeld is not generally productive; but in the lower and more sheltered valleys it yields wheat, flax, and hemp. Wood is abundant. The mineral products, which are of importance, comprise iron, copper, lead, coal, and building-stone; while in addition to the rearing of cattle, sheep, and swine, polishing of stones, especially agates, is the chief industry.

The principality is divided into three governmental districts. Oldenburg is a constitutional ducal monarchy, hereditary in the male line of the reigning family. The constitution, based on that of 1849, revised in 1852, is common to the three provinces, which are represented in one joint chamber of 33 members chosen by free voters. Each principality has, however, its special provincial council, the members of which are likewise elected by votes; while each governmental district within the provinces has its local board of councillors, and its several courts of law, police, finance, etc., though the highest judicial court of appeal and the ecclesiastical and ministerial offices are at Oldenburg. There are two gymnasia, one higher provincial college, several secondary and 500 elementary schools. Oldenburg is represented in the Bundesrath or Federal Council of the German Empire by one member, and in the Reichstag or Diet by three members.

History.—The territory now included in the grand-duchy of Oldenburg was in ancient times occupied by the Teutonic race of the Chauci, who were subsequently merged with the more generally known Frisii, or Frisians; and the land, under the names of Ammergau and Lerigau, was long included among the dominions of the Dukes of Saxony. In 1180 the counts of Oldenburg and Delmenhorst succeeded in establishing independent states from the territories of Henry the Lion, which fell into a condition of disorganization after his downfall. On the death 1667 of Count Anthony Gunther, his dominions, in default of nearer heirs, fell to the Danish reigning family, and continued for a century to be ruled by viceroys nominated by the kings of Denmark. This union was severed 1773, when, by a family compact, Christian VII. made over his Oldenburg territories to Grand-Duke Paul of Russia. Paul having renounced the joint countships of Delmenhorst and Oldenburg in favor of his cousin,

Frederick Augustus, the emperor raised the united Oldenburg territories to the rank of a duchy. The present reigning family is descended from Duke Peter Friedrich Ludwig, cousin to the Prince-bishop Frederick Augustus. For a time the duke was a member of Napoleon's Rhenish Confederation; but French troops having, in spite of this bond of alliance, taken forcible possession of the duchy 1811, and incorporated it with the French empire, the ejected prince joined the ranks of the allies. In recognition of this adhesion the Congress of Vienna transferred certain portions of territory, with 5,000 Hanoverians and 20,000 inhabitants of the quondam French district of the Saar, to the Oldenburg allegiance. From these new acquisitions were organized the district Amme and the principality of Birkenfeld, while Oldenburg was raised to the dignity of a grand-duchy. The revolutionary movement of 1848 was quite as productive of violent and compulsory political changes in this as in other German states; and in 1849, after having existed for centuries without even a show of constitutional or legislative freedom, it entered suddenly into possession of one of the most extreme of liberal constitutions. The reaction in favor of absolutism, which the license and lack of purpose of the popular party naturally induced all over Germany, led 1852 to revision and modification of the constitution. In the German-Italian war, Oldenburg sided with Prussia, and afterward joined the N. German Confederation. The duchy concluded 1866 a treaty with Prussia, by which the grand-duke renounced his claims to the Holstein succession, for the cession to him of a small portion of Holstein territory, and an indemnity of 1,000,000 thalers. Oldenburg is now included in the German Empire.

OL'DENBURG: city, cap. of the grand-duchy of Oldenburg; pleasantly situated on the banks of the navigable river Hunte, 25 m. w.n.w. of Bremen. Pop. (1900) 26,635. Oldenburg is the seat of the administrative departments, and the focus of the literary, scientific, and commercial activity of the duchy. It has a normal school, military academy, public library of 85,000 vols., picture gallery, museum, etc. The grand ducal palace is notable for fine gardens, its valuable pictures and other art collections, and its library. The principal church is St. Lambert's, containing the burying vaults of the reigning family. Oldenburg is the seat of an active river-trade, and is noted for its excellent studs and its great annual cattle and horse fairs in June and August.

OLD-FIELD LARK: a local name in the Southern States for the meadow-lark (q.v.).

OLD FOLKS AT HOME: a famous Southern plantation song, written in 1850 by Stephen C. Foster. The song realized some $15,000 for the author.

OLD FORGE: Pa., borough in Lackawanna County; on the Lackawanna River, and on the Lehigh Valley, the

New York, S. & W., and the Delaware, L. & W. R.R.'s; about five miles southwest of Scranton. It was settled in 1830 and remained a part of the Old Forge township until 1899, when it was incorporated as a borough. It is in the anthracite coal region; a large number of the men and boys of the borough are engaged in coal-mining. The chief industries beside the mining and shipping of coal are glass-blowing, manufacturing silk goods, and making chemicals and fertilizers. It has a fine high school building and good grade schools. The government is administered by a burgess, who holds office three years, a borough council, and subordinate officials. Pop. (1900) 5,630.

OLD GLORY: a popular name for the flag of the United States. It was first applied in 1831 by William Driver, a sailing captain of Salem, Mass., who died at Nashville, Tenn., in 1886. Previous to the outbreak of hostilities between the North and South 'Old Glory' was flung to the breeze every day from the window of Captain Driver's Nashville house, but when the conflict began the old flag had to be secreted. It was kept out of sight till General Nelson's wing of the Union army appeared in Nashville 1862, Feb. 27, when Captain Driver presented it to the general to be hoisted on the Capitol. It was run up, and Captain Driver himself did the hoisting. Its name and history soon became familiar to all the soldiers in General Nelson's command.

OLD GRIMES: the hero of a popular humorous American ballad and song, by Albert Gorton Greene. The title is an adaptation from one of the metrical tales by George Crabbe, but the personage described in the ballad is an exaggerated study of an eccentric New Englander who flourished in the earlier half of the 19th century.

OLD GUARD, The: a popular name applied to a body of French troops in the army of Napoleon I. The Guard consisted of five regiments; was distinguished for bravery, and at the battle of Waterloo made the final charge of the French army.

OLDHAM, *ōld'ham:* parliamentary borough and flourishing manufacturing town of England, co. of Lancashire, on the Medlock, six m. n.e. of Manchester. It owes its rapid increase in population and in wealth to the extensive coal-mines in the vicinity, and to its cotton manufactures, which have increased remarkably in late years. It is not only the great centre of the hat manufacture, but is famed also for manufactures of fustians, velveteens, cords, cotton, woolen, and silk goods. Numerous silk mills, brass and iron foundries, machine-shops, tanneries, ropeworks, etc., are in operation. The parish church, the town-hall, the Blue-coat and the Grammar schools, are the chief edifices. Pop. (1901) 137,238.

OLD'HAM, John: about 1590-1636; b. England. He emigrated to Plymouth, Mass., 1623, where it is said he

tried to change the form of government. He became involved with Lyford in an intrigue to set up a separate worship. He lived afterward at Hull and Cape Ann, and represented Watertown at the general court 1634. In 1635 he visited the valley of the Connecticut river, and on returning thither with a vessel for the purpose of trading with the Indians was killed by them 1636. His explorations resulted in the settlement of Windsor, Conn., and his death brought on the Pequot war.

OLDHAM, John: 1653, Aug. 9—1683, Dec. 8: English satirist: b. Shipton, Gloucestershire; son of a non-conformist minister. He was educated at Oxford, where he took high rank in Greek, Latin, and poetical composition. His limited means compelled him to leave the univ. 1674, and he was for three years usher in a free school at Croydon. His first published poem was an ode on the death of a friend, full of sympathy and tenderness in strong contrast to the harsh satire of his later writings. He continued to write as a relief from the drudgery of teaching Latin and Greek. Some of his MSS. attracted the attention of the principal wits of London, who visited him at Croydon. He went to London 1681, where he became known by his *Satires on the Jesuits,* which appeared in the height of the excitement regarding the Popish plot. He wrote several other satires. His last poem, *A Sunday Thought in Sickness,* is of a devotional character. His verse was rugged, but marked by warmth of feeling, forcible language, and fertility of incident. He died at Holme, Pierpont.

OLDHAMIA, n. *ōld-hā′mĭ-ă:* genus of peculiar fossil zoöphytes in the lowest Silurian rocks—so called from Prof. Oldham, to whom the genus was dedicated by Forbes, its discoverer. Only two species are known, but they are of peculiar interest, because, with their associated worm-tracks and burrows, they are the earliest distinct evidence of life on the globe. They exist as mere tracings on the surface of the laminæ of metamorphosed shales, all remains of the substance of the organism having disappeared. The form of the hard polypidom is preserved, and shows a jointed main stem, giving off at each joint, in one species a circle of simple rays, and in the other a fan-shaped group. Forbes pointed out their affinities in some respects to the *Hydrozoa,* in others to the *Polyzoa.* Kinahan, who described the genus at some length, considers them to have been *Hydrozoa* allied to *Sertularia;* while Huxley places them among the *Polyzoa.*

OLD HICKORY: an affectionate nickname given to Andrew Jackson (q.v.) by his troops, on account of his toughness and endurance of hardship. It seems to have been first conferred on occasion of his march back from Natchez in February 1813, when, after having sent him there to foil an expected British attempt on New Orleans, Secretary Armstrong ordered him to disband his men. Jackson in great wrath marched them home in a body, undergoing great discomforts on the way.

OLD HUNDRED: a popular religious hymn tune adopted from a 15th century melody. The tune is found in the Flemish Psalter (1540) and in the Dutch Psalter (1561). In England it was originally sung to the 100th Psalm. Consult Fitzgerald *Stories of Famous Songs* (1897).

OLD IRONSIDES: a name applied to the United States frigate Constitution (q.v.).

OLD KENTUCKY HOME: a famous plantation song, written and set to music by Stephen Collins Foster, in 1850.

OLD LINE STATE: a popular name for the state of Maryland, which in the early colonial days was the dividing line between the Crown land grants of William Penn and Lord Baltimore.

OLD MAN OF THE MOUNTAIN: a name given to a huge rock on Profile Mountain, in the Franconia Range, N. H. When viewed from certain positions it bears a marked resemblance to a man's face. The name is sometimes given to Profile Mountain.

OLD MAN OF THE MOUNTAIN. See MOHAMMEDANISM.

OLD MAN OF THE SEA, (1) frequently in Greek poetry, an epithet applied to Nereus. (2) In the *Odyssey*, an epithet also of a sea-deity, Phorcys, or Phorcus. (3) In the 5th voyage of *Sinbad the Sailor* in the *Arabian Nights' Entertainments*, an old man, who, under pretense of being carried by Sinbad across a brook, fastened himself upon the latter's back and could not be dislodged. Sinbad finally made him intoxicated, threw him upon the ground, and broke his head with a stone. In a derived sense, the expression is often used of a bore, or of a burden that cannot be escaped.

OLDMIXON, *ōld-mĭks'on*, JOHN: 1673-1742, July 9; b. Bridgewater, England. He wrote several unsuccessful plays, and then gave attention to political writing, publishing *The British Empire in America*, 1708 and 41; *Memoirs of North Britain*, and *Memoirs of Ireland*, 1715-6; a *Critical History of England, Ecclesiastical and Civil*, 1726; *Clarendon and Whitlock Compared*, 1727; histories of the reigns of Henry VIII., Edward VI., Mary and Elizabeth, also of the Stuarts, William and Mary, Anne, and George I., 1730-39; *Memoirs of the Press, Historical and Political, for Thirty Years*, 1742. These writings are of little merit, by reason of their strong whig partisanship. He was a bitter and unscrupulous critic of Pope and other celebrities in his magazine articles and in his *Prose Essay on Criticism*, to which Pope alludes in the *Dunciad*.

OLD NICK: popular sobriquet of the Devil, derived both from Saint Nicholas (Ger. Nicolaus, diminutive Nickel, often used of the Devil) and from Nekker (or

Nikker), a Teutonic water-sprite whose appearance to sailors forboded death and drowning. Old Harry, Old One, Old Scratch are other names similarly used.

OLD NORTH STATE, The: a name sometimes given to North Carolina.

OLD OAKEN BUCKET, The: a poem by Samuel Woodworth, an American poet, written in 1817 and first published as *The Bucket*. The air to which it is set is an adaptation of the music of Moore's song *Araby's Daughter*.

OLD ORCHARD: Maine, town in York County; on the Atlantic Ocean, and on the Boston & Maine railroad; about 10 miles southwest of Portland. It is a famous summer resort, on account of its smooth ocean beach 12 miles long, where surf bathing is safe, and there are good opportunities for fishing. Deep-sea fishing is a favorite sport, but those who prefer still-water fishing go to Biddeford Pond nearby. The Methodist camp-meeting grounds are visited annually by a large number. It is becoming a summer convention place. In 1903 conventions were held here under the auspices of the Christian Workers' League, the Christian Alliance, and the Women's Christian Temperance Union. There were held also in the month of August the same year, a Musical Festival, a White Cross Convention, and a Methodist Convention. The population is several thousand in the summer months, but the regular residents number about 1,000.

OLD POINT COMFORT: Va., a famous watering place in Elizabeth City County; on the point of a small peninsula where Chesapeake Bay and Hampton Roads enter the Atlantic Ocean. It is near Fort Monroe and about five miles north of Norfolk. The climate is equable, the opportunities for bathing, fishing, and boating are excellent; the garrison at the Fort, and the cities of Norfolk and Portsmouth nearby add to the attractions.

OLD PROBABILITIES: a popular nickname for the head director of the United States Weather Bureau; a personification of weather prophecies generally.

OLD PUT: a popular sobriquet bestowed upon the American general, Israel Putnam (q.v.).

OLD RED SANDSTONE: name applied formerly to a large series of paleozoic rocks, of which red sandstones are the most conspicuous portions, but which contains also white, yellow, or green sandstones, as well as beds of clay and limestone. The group lies below the carboniferous strata, and was called 'old' to distinguish it from a newer series of similar beds above the coal-measures. The discovery that the highly fossiliferous calcareous rocks of Devonshire, England, and of the European continent occupied the same geological horizon showed that the name was very far from being descriptive of all the deposits of the period, and suggested to Murchison and Sedgewick the desirableness of giving

them a new designation. They consequently proposed Devonian, which has been extensively adopted; though liable to the objection urged against the name which it has supplanted, inasmuch as it incorrectly limits geographically what the other limits lithologically. The old name has been rendered classical by the labors and writings of Hugh Miller, the original monographer of these rocks. In America the main groups falling under the head of the Devonian or Old Red Sandstone System are those styled by the New York Geological Survey, the Catskill, Chemung, Portage, Hamilton, Marcellus, Upper Helderberg, Schoharie and Oriskany groups. See DEVONIAN SYSTEM.

OLD RELIABLE: in the American Civil War, a nickname applied to Gen. George H. Thomas (q.v.).

OLD ROW'LEY: nickname of Charles II. of England, said to have been derived from the name of one of the king's famous racehorses, whence, also, a part of the Newmarket racecourse is known as 'Rowley mile.'

OLD SOUTH CHURCH: historic edifice in Boston, Mass. The present structure was erected for the Third Church in Boston (Congl.) 1723, on the same ground where the first structure had stood since 1669. It is a conspicuous object in the business portion of the city, on Washington st., and, though no longer used for sacred purposes, has been constituted a permanent monument of the past. The following are some incidents in the history of the edifice: In 1707, Benjamin Franklin was baptized there. In 1761, the Rev. Thomas Prince, pastor, at his decease left his classics and a valuable collection of Americana, to be a permanent 'New England Library' in a chamber of the steeple. Seven years later a 'great clock' was put in the steeple. 1768, June 14, the first of the great popular Revolutionary meetings in the church was held, adjourned thither for lack of room in Faneuil Hall; an English frigate had recently arrived to enforce the new revenue laws. In 1773, a meeting was held that led to the destruction of the cargo of tea. At such gatherings the walls often echoed to the eloquence of James Otis and Samuel Adams. In 1775, Oct. 27, the church was taken for a cavalry riding school by the British; pulpit and pews were destroyed; the pulpit sounding-board and the two east galleries only were retained, the lower for the selling of liquors; and many of Thomas Prince's books and manuscripts were used for lighting fires. The house, repaired, was opened for worship again 1783. The large glass chandelier, given 1802 by Mrs. John Sweetser at a cost of $800, fell 1887 and was broken in pieces. After the great Boston fire, 1872, the building was for two years used as the city post-office. The last religious service by the old church and society was held there 1872, Nov. 17. See BOSTON. Consult: Hill, *History of the Old South Church* (1890).

OLD SQUAW, or OLD WIFE: the long-tailed duck (*Clangula hiemalis*), a sea-duck present in the nesting

season in all boreal regions, and visiting the United States in winter. It is blackish and whitish; head, neck and lower parts mostly white in winter; a patch of gray on the head; breast brownish black; bill black and orange; tail very long—a means of instant recognition of the drake. The tail of the female is short, and her plumage is mostly grayish brown. Gunners sometimes call the drake 'old injun' and the female alone 'old squaw'; also 'south-southerly,' etc. Most of the names are taken from its noisy habits, for it is almost continually calling, but its cries are musical. They are favorite with gunners more from the skill required in shooting them, on account of their swift flight and wary ways, than for excellence of flesh; they rarely present themselves for a shot except when they come into the bays and river mouths for food at sunrise, flying in long lines. They also occur on the Great Lakes.

OLD TESTAMENT, The: the canonical books of the Scriptures which were composed and published before the Christian era. See Bible.

Origin and Formation.—It is impossible to be very certain about the date of composition and the authorship of most of the books of the Old Testament, or the manner and time of bringing them together into the collection in which they now appear. Few of them contain any statement in regard to their authorship, which we can reasonably suppose to have been made by the author himself, so that, who he was, and when he lived, must, for the most part, be determined by the evidence to be found in the contents of the book itself, or by references to it contained in other Biblical books. When the formation of the collection now known as the Old Testament, began, how it was carried on, and when it was completed, are matters no one of which can be determined with certainty.

Ancient Versions.—The most important Ancient Versions of the Old Testament are the Greek Versions (especially the Septuagint); the Aramaic Versions, called Targums; the Syriac Versions (especially the Peshitto); and the Latin Versions, especially the Vulgate of Jerome.

Literary Elements.—The Old Testament cannot be correctly understood or rightly used, unless regard is given to the different literary elements, or forms of literature, which it contains. There are to be found in it books which, for want of a better term, may be called historical works, as, for example, the books of Samuel and Kings. These, however, are not histories in the modern sense of this word, but are works of religion, in which the lessons of history are used to bring men into harmony with the will of God. There are also in the Old Testament poetical works, as, for example, the Psalms and the book of Job, which exhibit all the phenomena that characterize poetry in general. We find also, in its contents, works of a practical philosophy,

as, for example, the books of Proverbs and Ecclesiastes, all of which have the form, and, in some measure, the substance of poetry. Another, and a large element, of its contents is to be found in the collections of the sermons, or discourses, of the prophets, which form the main part of the prophetical books, as, for example, the books of Amos and Isaiah.

Each of these different kinds of literature has a nature and characteristics of its own, and must be interpreted, if interpreted correctly, in harmony with its own peculiar form and characteristics. This is especially true of the poetical and prophetical portions of the Old Testament.

Prophecy in the Old Testament.—In the prophetical discourses, or sermons, of the Old Testament, we find the one thing which separates it as a book of religion from all other literature. The essential and distinguishing thing about the sermons and writings of the prophets was, that they were messages received directly from God, which were to be given to the men of the prophet's time for the purpose of changing, in some way or other, existing conditions in the national life. Hence, the prophetic discourses were always occasioned by a definite and actually existing historical situation. By them, the prophet sought to accomplish some result in the life and conduct of his hearers. Therefore, the motives he urged, and the truths he presented, were those naturally suited to secure the desired result. If he made predictions, he did so to show what consequences would follow certain lines of conduct in order to incite men to, or dissuade men from, some particular way of living. Moreover, since the constant aim of the prophet was to secure some desired spiritual condition on the part of his hearers, and much that was predicted by the prophets was only to come to pass in the future in consequence of the existence of this desired spiritual condition, it follows that there was a very large conditional element present in all the predictions of the Old Testament prophets. The desired condition was not always in existence at the time to which the prediction related, and, consequently, there is much predictive prophecy which, so far at least as the letter of the prediction is concerned, has not yet been fulfilled, and cannot now ever be fulfilled.

This fundamental law of prophecy is clearly set forth by the prophet Jeremiah, speaking in the name of Jehovah, in chapter xviii., verses 7-10, of his book. The word of Jehovah to him was:

> At what instant I shall speak concerning a nation, and concerning a kingdom, to pluck up and to break down and to destroy it; if that nation, concerning which I have spoken, turn from their evil, I will repent of the evil that I thought to do unto them. And at what instant I shall speak concerning a nation, and concerning a kingdom, to build and to plant it; if they do that which is evil in my sight, that they obey not my voice, then I will repent of the good, wherewith I said I would benefit them.

We may see an illustration of the working of this law in the case of the apparently positive and unconditional

declaration of the prophet Jonah in regard to the fate of Nineveh. 'Yet forty days,' the prophet proclaimed, 'and Nineveh shall be overthrown.' But it was not overthrown; for

'they turned from their evil way; and God repented of the evil which he said he would do unto them; and he did it not.'

We find also a progressive element in the Old Testament prophecies. The same progressive character appears in this part of the divine revelation as is to be seen in revelation as a whole. The later prophets often presented some great fact in a higher and more complete way than those who had preceded them. If, for example, we study Psalm cx. and Isaiah ii, 2-4, in connection with each other, we shall find that they both present to us the fact that Jehovah, either in His own person, or in the person of the Messianic King, who shares His throne, and represents His authority, is to be the acknowledged lord and sovereign of the nations. But the two passages do not represent this fact as coming to pass in the same way. The first passage, Psalm cx. declares that this fact will come to be, because Jehovah will, in His wrath, by the exercise of His might, make the enemies of His appointed king a footstool for his feet, while the passage in Isaiah presents to us this same fact as resulting from the joyful submission of the nations to the rule of Jehovah on account of the high estimation which they will put upon His law. These two views are not necessarily mutually exclusive, or even inconsistent with each other: but the latter may reasonably be regarded as presenting the higher and more spiritual side of the one great fact.

The same progressive element may be noticed in those predictive passages which relate still more directly to the work of the Messiah. In the earlier days of Israel's history, when the kingdom was still in a more or less flourishing condition, the Messiah was generally presented, in the preaching of the prophets, as a great and victorious king. But, in the discourses of the prophets of the exile and the post-exilic period, the most common representation is that the Messiah will accomplish His work of salvation through humiliation and suffering. This, however, does not mean that the ideas relating to the character and work of the Messiah to be found in the writings of the prophets were a natural growth, springing from the national consciousness in a purely human way, under the stimulation of the varying hopes and fears of the national history. They were not the less truths received from God, because, in giving them to men, He had regard to the ability of men to receive them. They did not cease to be revelation, because they were revealed according to a national receptivity conditioned by national circumstances.

Another element which appears not infrequently in the prophetic writings, is due to the fact that the prophets were often poets, and, like all poets, they set forth purely ideal creations of the imagination. Hence, we find some-

times in the prophetic predictions an ideal element, which could not have been expected by the prophet ever to be realized in actual experience or history. For example, it is clear that the prophet who spoke or wrote the words contained in Isaiah lii. 7-10, intended to predict that Jehovah would cause the city of Jerusalem to be rebuilt, and would bring back the exiles of Judah to their own land. In making this prediction, however, he tells us that a welcome messenger will be seen upon the hills near Jerusalem, bringing to the ruins of the city, and to some mysterious beings who will be seen watching over these ruins, the news of the speedy return of the people and the future rebuilding of the city. When these watchmen shall see Jehovah bringing back the nation to its own land, they will, the prophet declares, gaze into one another's face with gladness, and raise a song of joy. But we know from the account of the return from the Babylonian exile contained in the books of Ezra and Nehemiah, and also because of the natural possibilities of the case, that these events which are foretold in verses 7 and 8 of the passage in question, never actually occurred, and, indeed, never could have occurred. These events were, therefore, only creations of the prophet's imagination, ideal additions of a poetic nature to the facts of the case.

Old Testament Theology.—The teachings of the Hebrew prophets which are to be found in the Old Testament, and the other teachings of inspired men, which it contains, form the material from which is constructed the science of Old Testament theology. This science is a history as well as a science, and may be termed a historical science. The method of investigation and determination employed in it is the historic, but the results obtained by the historic method are classified according to their scientific theological relations. We may, therefore, define Old Testament theology as the science which consists of the inspired statements and teachings of the Old Testament that set forth facts and doctrines of revealed religion, classified according to their scientific theological relations, and presented so as to show their historic succession. Its aim is to show the progress of revelation by determining what inspired ideas and teachings belonged to its successive stages. This it does by exhibiting in their historic succession the religious ideas and teachings of each of the inspired authors and teachers of the Old Testament, and by showing what ideas of this kind belonged to each epoch in the nation's history. The definition, of course, assumes that there is a revealed religion, the facts of which are supernatural, and the truths of which have been made known to men by God. It also assumes that the Old Testament consists of inspired writings in which facts and truths of this kind are authoritatively and correctly stated by men who wrote and spoke as they were moved by the Spirit of God. It is necessary, therefore, according to this definition, to distinguish between Old Testament theology, and

the history of the religion of Israel. The former is the history of revelation, the latter the history of religion. The former sets forth the things which were given to men from God, as the things they ought to believe and do; the latter tells us what were the religious beliefs and practices of the whole nation, in which beliefs and practices there was much, throughout the whole Old Testament age, which was common both to the Hebrew people and the other nations of the Semitic race. Even if all inspiration should be denied to the Old Testament writings, it would still be necessary to make this distinction between the history of the religion of Israel and Old Testament theology, in order to be scientifically accurate. For it would still be true that there is a great and striking difference between the religion of the great teachers of the nation, and the religion of the nation itself; and a scientific account of the religious faith and life of the people could not ignore this fact, or treat it as of little account.

As a historical science, Old Testament theology will depend, for the form in which its material will be arranged, upon the dates which may be assigned to the writings from which this material is derived. Even though this material remains absolutely unchanged in substance, yet each new theory about the dates of the books of the Old Testament will produce a new Old Testament theology. What any particular work on Old Testament theology shall be, will be determined in no small degree by the conclusions previously made by its author in the department of higher criticism. It is for this reason that no attempt is made in this article to present any particular scheme of Old Testament theology. It seems better, for the present, to indicate the true nature of the science, and to show how the final construction of it must be made, when at last this shall be possible. The religious teachings of each of the Old Testament books will naturally be given in the various articles relating to these books. The time has not yet come for constructing, from this material, a final Old Testament theology. When the dates of the Old Testament books and the order of events in the history of Israel have been finally determined, it will be possible to construct a final Old Testament theology by employing either one of two methods, each of which has its advantages and its disadvantages. One of these methods, which may be called the scientific method, gives special prominence to the scientific theological relations of the material. Taking, in their scientific order, each of the doctrines presented in the Old Testament, it sets forth the form in which this doctrine was taught in each of the different periods of the nation's history, and, so far as may seem desirable, in each of the books and writings of this period. The great advantage of this method is that it secures a clear view of the historical succession of the teaching in the case of each particular doctrine; but the principal disadvantage of using it is that we do not ob-

tain by it a good idea of the whole body of the doctrines taught in any one period, or by any individual teacher. The other method, which may be called the historical method, gives special prominence to the historical relations of the material. It first determines what were all the religious teachings of each period of the nation's history, and, so far as may seem desirable, of each book and document produced in this period. Then it distributes these teachings into groups according to their scientific theological relations. The chief advantage of this method is that by it there is secured a clear view of the whole body of the teaching set forth in any particular period, or by any individual teacher; but its great disadvantage lies in the fact that it does not make very evident what was the historical succession of the teaching in the case of any particular doctrine.

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OLD'TOWN: Maine, city in Penobscot County; on the Penobscot River, and on the Bangor & A. and the Maine C. R.R.'s; about 11 miles northeast of Bangor. It was settled in 1820, and was a part of Orono until 1840 when it was incorporated as a town, and was chartered as a city in 1891. It is in a lumber region, and the chief manufactures are wood products, machinery, and

foundry products, pulp, boots and shoes, woolen goods, and large quantities of lumber in different forms. Some of the prominent buildings are the Odd Fellows' building, the city hall, and the high school. It has a free public library and a city hospital. The revised charter provides for a mayor and council elected annually. Pop. (1900) 5,763; (1910) 6,317.

OLDYS, *ōl'dĭs* or *ōldz*, WILLIAM: most erudite and industrious bibliographer: 1696-1761, Apr. 15. Of his early life, little is known. His father dying 1708, left him a small property which Oldys squandered as soon as he got it into his hands. Most of his life was spent as a bookseller's hack-writer. For about ten years, Oldys acted as librarian to Harley, Earl of Oxford, whose valuable collection of books and MSS. he arranged and catalogued. His chief works are *The British Librarian, exhibiting a Compendious Review of all Unpublished and Valuable Books in all Sciences* (London 1737, anonymously); *Life of Sir Walter Ralcigh*, prefixed to Raleigh's *History of the World* (1738); Translation of Camden's *Britannia* (2 vols.); *The Harleian Miscellany, or a Collection of Scarce, Curious, and Entertaining Tracts* (8 vols. Lond. 1753).

OLEACEÆ, *ō-lē-ā'sē-ē:* natural order of exogenous plants, consisting of trees and shrubs, with opposite leaves, and flowers in racemes or panicles. The calyx is in one piece, divided, persistent; the corolla is hypogynous, generally 4-cleft, sometimes of four petals, sometimes wanting; there are generally two, rarely four stamens; the ovary is free, 2-celled, the cells 2-seeded; the fruit is a drupe, a capsule, or a samara (see these heads); the cotyledons are foliaceous. Nearly 150 species are known, mostly natives of temperate countries; among them are the olive, ash, lilac, privet, phillyrea, fringe tree, etc. Between some of these there is great dissimilarity, so that this order is apt to be regarded as a very heterogeneous group; but the real affinity of the species composing it is seen in the fact that even those most unlike can be grafted one upon another, as the lilac or the olive on the ash. Bitter, astringent, and tonic properties are prevalent in this order.

OLEAGINOUS, a. *ō'lē-ăj'ĭ-nŭs* [L. *olĕā'gĭnŭs*, of or pertaining to an olive-tree—from *olĕŭm*, oil: L. *olĕă*, an olive-tree]: oily; unctuous. O'LEAG'INOUSNESS, n. *-nĕs*, oiliness.

OLEAN, *ō-lē-ăn':* N. Y., city in Cattaraugus County; on the Allegheny River at the mouth of Olean Creek, and on the Pennsylvania, the Erie, the Pittsburg, Shawmut & N. R.R.'s; about 68 miles in direct line south by east of Buffalo. It was settled in 1804 by Major Hoopo and David Heuston, was incorporated as a township in 1808, as a village in 1854, and was chartered as a city in 1893. It is in a fertile agricultural region, and near the Pennsylvania oil fields. In the vicinity is a mass of rocks of peculiar formation known as 'Rock City.' It is

a distributing point for large quantities of petroleum which is brought by pipe lines from the oil fields south of the city, and considerable of it is sent by the same means to other cities. The lumber and leather interests are important. The chief manufacturing establishments are lumber mills, tanneries, oil-refineries, glass factories, machine shops, railroad shops, cooperages, wagon and carriage factories, brewery, brick yards, flour-mills and furniture factories. The number of employees is about 3,000. It has a large trade in oil, lumber and lumber products, leather, and glass. It has a hospital, a State armory, a city park, and a driving park. The educational institutions are eight public schools, one parish school, a Commercial College, and the Foreman Library. There are about 20 church buildings; the Methodists and Roman Catholics have each three. The two banks have a combined capital of $225,000, and the total assets are over $4,000,000. The government is vested in a mayor, elected for two years, and 12 aldermen, six of whom are elected each year. Pop. (1910) 14,743.

OLEANDER, n. *ō'lĕ-ăn'dĕr* [F. *oléandre;* It. *oleandro,* the rose-bay tree—perhaps from mid. L. *arodan'drum,* a corruption of *rhododendron,* more probably (according to Skeat) from a middle Latin word *lorandrum:* genus of plants of nat. order *Apocynaceæ,* having a 5-parted calyx, set round on the inside at the base with many tooth-like points or glands, a salver-shaped 5-cleft corolla, in the throat of which is a 5-parted and toothed or lacerated corona, five stamens, the anthers adhering to the stigma, the fruit composed of two follicles. The species are evergreen shrubs with leathery leaves, which are opposite or in threes; the flowers in false umbels, terminal or axillary. The COMMON OLEANDER (*N. oleander*), native of s. Europe, n. Africa, and many of the warmer temperate parts of Asia, is frequently planted in many countries as an ornamental shrub. It has beautiful red, sometimes white, flowers. The English call it ROSE BAY, and the French ROSE LAUREL (*Laurier Rose*). It attains a height of eight or ten ft. Its flowers give a splendid appearance to many ruins in s. Italy. It delights in moist situations, and is frequent near streams. All parts of it contain a bitter and narcotic-acrid juice, poisonous to men and cattle, which flows out as a white milk when young twigs are broken off. Cases of poisoning have occurred by children eating its flowers, and even by the use of the wood for spits or skewers in roasting meat. Its exhalations are injurious to those who remain long under their influence, particularly to those who sleep under it. A decoction of the leaves or bark is much used in s. France as a wash in cutaneous maladies.—*N. odoratum,* an Indian species, has larger flowers, which are very fragrant.—*N. piscidium* (or *Eschaltum piscidium*), perennial climber, native of the Kasya Hills, has a very fibrous bark, the fibre of which is used in India as hemp. The steeping of the stems in ponds kills fish.

OLEASTER, n. *ō'lĕ-ăs'tĕr* [L. *oleaster*, the oleaster—from L. *ŏlĕă*, the olive-tree: It. *oleastro*, a wild olive-tree]: a shrub (*Elæagnus angustifolia*) of the order *Elæagnaceæ*, an ornamental plant introduced from western Asia and southern Europe into temperate climates as an ornamental plant. It grows about 20 feet tall, is often spiny, has narrow light green leaves about two inches long, small, fragrant bell-shaped flowers, followed by yellow, oval silvery-scaly fruits. It seems to prefer well-drained limy soil and sunny situations. It is very popular in cold climates, especially in the Dakotas and Minnesota, where it has proved hardy.

OLE BULL. See BULL, OLE BORNEMANN.

OLECRANON, n. *ō-lĕk'ră-nŏn* [Gr. *ōlenē*, the elbow; *kranos*, a helmet]: in *anat.*, the projecting part of the upper end of the ul-na, forming the back of the elbow. OLEC'RANOID, a. *-ră-noyd* [Gr. *eidos*, resemblance]: resembling an elbow.

OLEFIANT, a. *ō-lē'fĭ-ănt* [L. *olĕŭm*, oil; *fīō*, I am made]: producing oil; term aplied to a gas obtained by heating a mixture of two measures of sulphuric acid and one of alcohol—so called from its forming an oily liquid when mixed with chlorine. OLEFINES, n. plu. *ŏl'ĕ-fīnz*, the series of chemical bodies homologous with ethene or olefiant gas. OLEFIANT GAS (C_2H_4), ethylene, or heavy carburetted hydrogen, discovered 1796, is transparent and colorless, possesses a disagreeable alliaceous odor, and acts as a poison when breathed. Its specific gravity is 0·981. It takes fire when brought in contact with a flame, and burns with bright clear light. When this gas is mixed with oxygen or atmospheric air in the proportion of 1 volume with 3 volumes of oxygen, or with 15 volumes of atmospheric air, it forms a powerfully explosive mixture. It is more soluble in cold than in hot water—100 volumes of water at 32° absorbing 26·5 volumes of the gas, while at 68° they absorb only 14 volumes. It was liquefied by Faraday, under great pressure, but remained unfrozen at —166°. If it be conducted through strongly-heated tubes, or if a continuous series of electric sparks be passed through it, it is decomposed into a very dense black carbon, and double its own volume of hydrogen: and if it is subjected to a less intense heat, the products of decomposition are carbon and light carburetted hydrogen or marsh-gas (CH_4). Chlorine acts upon this gas in a very remarkable manner. When the two gases are mixed in equal volumes, they combine to form a heavy oily liquid, to which the term chloride of olefiant gas, or Dutch Liquid (q.v.), is given. Olefiant gas is a constituent of the gaseous explosive admixtures that accumulate in coal-pits, and of the gaseous products yielded by the distillation of wood, resinous matters, and coal; and the brightness of the flame of ordinary gas depends partly on the quantity of olefiant gas present. This gas is obtained most readily by the action of sulphuric acid on alcohol.

OLEIC, a. *ō′lĕ-ĭk* [L. *olĕŭm*, oil]: oily. OLEATE, n. *ō′lĕ-āt*, a salt of oleic acid. OLEIFEROUS, a. *ō′lĕ-ĭf′ĕr-ŭs* [L. *fero*, I produce]: producing oil, as seeds. OLEOMETER, n. *ō′lĕ-ŏm′ĕ-tĕr*, or ELÆOMETER [Gr. *metron*, a measure]: an instr. for testing oils, ascertaining their densities. It consists of a very delicate thermometer-tube, the bulb large in proportion to the stem. It is divided into 50 degrees, and floats at zero in pure oil of poppy-seed, at 38° to 38½° in pure oil of almonds, and at 50° in pure olive oil. OLEON, n. *ō′lĕ-ŏn*, a liquid obtained by the distillation of a mixture of oleine and lime. OLEOPHOSPHORIC, a. *ō′lĕ-ō fŏs-fŏr′ĭk*, term applied to the peculiar acid found in the brain and nervous matter. Oleophosphoric acid is a yellow viscid substance, which is insoluble in water and cold alcohol, but dissolves readily in boiling alcohol and in ether. When boiled a long time with water or with alcohol, or when treated with an acid, it resolves itself into oleine and phosphoric acid; while alkalies decompose it into phosphoric acid; oleates, and glycerine. O′LEO-RES′INS, natural mixture of a resin and an essential oil, forming the vegetable balsams and turpentines. O′LEO-SAC′CHARUM, n. *săk′kă-rŭm* [L. *oleum*, oil; *sacchărum*, sugar]: a mixture of oil and sugar. OLEOUS, a. *ō′lĕ-ŭs*, or OLEOSE, a. *ō′lĕ-ōs*, oily.

OLEIC ACID: $C_{18}H_{34}O_2$, the most important member of the 'oleic' series of acids occurs as the glyceride triolein, $C_3H_5(C_{18}H_{33}O_2)_3$, in most liquid and solid fats as olive, almond, and cod-liver oils, lard, tallow, etc., olive oil being about 72 percent pure olein. To obtain the free acid the fat is saponified with alkali, the soap so formed dissolved in water and the fat acids liberated by the addition of dilute hydrochloric or sulphuric acids. This impure oleic acid is heated for a time with powdered lead oxide (litharge). The lead salts so obtained are extracted with ether which dissolves only the lead oleate. On acidifying the ethereal solution with dilute hydrochloric acid the lead is precipitated as lead chloride, leaving the pure oleic acid in solution from which it can be obtained by evaporation of the ether. The decomposition of triolein into oleic acid and glycerine may be accomplished by other means such as heating with superheated steam or with water and sulphuric acid. Oleic acid is a thin colorless oil at ordinary temperatures but solidifies when cooled to 4° C. (39° F.). Crystallizes from alcohol in silky needles melting at 14° C. (57° F.). Specific gravity at 19° C. (66° F.) is 0.897. It decomposes when heated to boiling at ordinary atmospheric pressure, but may be distilled unchanged under diminished pressure or with superheated steam. Insoluble in water, very soluble in alcohol, ether, and most other organic solvents. It is a monobasic acid forming many well defined salts, many of which are of use in the arts or in medicine. Sodium oleate is the chief constituent of castile soap; potassium oleate is found in soft soap; lead oleate is the 'lead plaster' of the pharmacist. When well cooled oleic

acid is treated with nitrogen trioxide it is changed to a solid isomeride, elaidic acid, which is used to some extent in making candles.

OLEIN. True olein is the glyceride of oleic acid. Composition, $C_3H_5(C_{18}H_{33}O_2)_3$. It occurs in most vegetable and animal fats, notably in olive oil, lard, and tallow. A colorless, odorless, nearly tasteless oil, insoluble in water, only slightly so in alcohol, soluble in ether. Alkalies saponify it to the alkali salt of oleic acid (soaps) and glycerine. Nitrogen trioxide changes it to its solid, isomeride elaidin. It is difficult to obtain it perfectly free from the glycerides of other acids occurring with it. The term 'oleine' is applied to various commercial products, such as the liquid fats used by the soap-maker and the liquid fatty acids utilized by the candle manufactur.

OLENEK, *ŏ-lyĕ-nyôk′:* a river of northern Siberia, which rises between Mounts Boldisno and Dsholokon, and after a tortuous northeastern course of about 1,000 miles enters the Arctic Ocean 100 miles to the west of the Lena delta. It is six miles wide and 20 feet deep at its mouth, on the left bank of which is the village of Ust Olenskoe.

OLEOGRAPH, *ō′lē-ō-grăf:* ordinary chromo-lithograph which has been 'roughed,' as it is termed, on a lithographic stone engraved to imitate canvas. The resemblance to oil paintings which oleographs have when looked at not too closely is produced partly by this roughing process, partly also by their being mounted on canvas, sized, and varnished. The colors used in printing oleographs, since they are meant to imitate oil pictures, are used a little darker than in the case of chromo-lithographs in imitation of water-color drawings.

OLEOMARGARINE, n. *ō′lĕ-ō-mâr′găr-ĭn,* called also Butterine [L. *olĕŭm,* oil, and Eng. *margarine*]: a mixture of fats used as a substitute for butter. Oleomargarine was invented by a Frenchman, Mège-Mouries in 1870. His idea was to produce a substance very like butter in physical properties and chemical composition that would be more wholesome than and as cheap as poor butter. He used the best of beef-suet as a basis; 1,000 parts of well washed and finely chopped fat were digested at 45° C. (113° F.) with 300 parts of water, 1 part of carbonate of potash and two stomachs of sheep or pigs. After two hours the membranes had dissolved under the influence of the pepsin of the stomachs and the melted fat had risen to the surface. It was drawn off, salted and allowed to cool whereupon most of the stearin and palmatin crystallized out. This semi-solid mixture was subjected to hydraulic pressure and the fluid oleo 50-60 percent pressed out. The oleo was churned with 10 percent of its weight of milk together with a little butter color, and the product worked up like regular butter. Many changes have been made in the manufacture of oleomargarine since its invention by Mège-

Mouries. The process given below as described by Armsby (*Science*, Vol. 7, pp. 471-472) is essentially the same as that described by Armour and Swift and is a fair representative of that followed in this country. From the beef-tallow is prepared the oleomargarine oil of Mège. The caul fat of freshly killed beeves is, after thorough washing first in tepid water and then in iced water, allowed to stand in a cold room until thoroughly cold. It is then rendered at a temperature between 130° and 175° F. The resulting oil is allowed to cool slowly until a considerable portion of the stearin and palmatin has crystallized out, and the pasty mass is then subjected to hydraulic pressure. The still fluid (about two thirds of the whole) flows out into a tank of cold water, where it solidifies into a granular mass which is known to the trade as 'oleo' oil or simply 'oleo.' The name 'oil' is somewhat misleading as the product is a granular solid of a slightly yellow color. Fresh leaf lard treated in substantially the same way as the beef tallow yields the 'neutral lard' or 'neutral' of the trade, also a granular solid of a white color.

The objects of this treatment are twofold, first, to produce fats as free as possible from taste or odor; second, to remove some of the difficultly fusible stearin and palmatin, in order that the finished product may melt readily in the mouth. Having thus secured the fats in the proper condition, the manufacturer proceeds to mix 'oleo' and 'neutral,' the proportions varying according to the destination of the product; a warm climate calling for more 'oleo,' a cold one for more 'neutral,' and to flavor the mixture with butter. This flavoring is conducted in large steam-jacketed vessels provided with revolving paddles, by which their contents can be thoroughly agitated. Here the 'oleo' and 'neutral' are melted and thoroughly agitated with a certain proportion of milk, or sometimes of cream, and a proper amount of butter-color. Forty-eight gallons of milk to 2,000 pounds of product are stated to be a common proportion. After sufficient agitation, the melted mass is run into cold water and as it cools is broken up by paddles so as to granulate the mass. After thorough washing it is salted and worked exactly like butter. The product is known as oleomargarine. Although it contains hardly more than a trace of butter, the latter flavors the whole mass so strongly that when well salted, as it usually is, it might readily pass with an inexpert or careless consumer for rather flavorless butter. Oleomargarine is the cheapest product made. By adding to the material in the agitator or 'churn' more or less pure butter what is known as butterine is produced, two grades of which are commonly sold, namely, 'creamery butterine' containing more and 'dairy butterine' containing less butter. Certain other substances such as cottonseed-oil, sesame oil, sugar, glycerine, and glucose are used to some extent by a few, usually unimportant makers. On the question of the wholesomeness of artificial butter there is a wide

difference of opinion, but most authorities say that a butter substitute carefully made from the fresh clean fat of healthy beeves or swine is wholesome.

The physical properties of oleomargarine are so similar to those of butter that it is very difficult to distinguish between them by any superficial test. For a good test that can be applied in the household, consult *Farmers Bulletin* (No. 131) United States Dept. of Agriculture. The analytical chemist is able to detect oleomargarine by making use of the fact that it contains a large percentage of fatty acids not soluble in water and a lower percentage of those volatile with water vapor than butter does. There has been both Federal and State legislation regarding this substance. The Federal law of 1886 imposed a special tax on the manufacturer ($600 per annum), the wholesaler ($480) and the retailer ($48). In addition the manufacturer must sell it in stamped packages, the stamps making an extra tax of two cents a pound. The act of 1902 abolished this tax of two cents but established new rates, namely 10 cents a pound on artificially colored oleomargarine, while oleomargarine free from any color that would cause it to look like butter was rated at one fourth of a cent a pound. The special taxes on the maker, etc., were not changed. Most states have an extra tax of their own. They vary widely and change frequently. Some merely add a few cents a pound, while others fix so high a rate or such conditions of manufacture or sale as to be practically prohibitory.

The production of oleomargarine in this country in 1888 was 34,325,527 pounds which increased to 53,146,659 pounds in 1906. Of this, 11,794,174 pounds, valued at $1,033,256, were exported in 1906.

OLERACEOUS, a. *ŏl'ĕr-ā-shŭs* [L. *olĕrācĕŭs*, resembling herbs—from *olus*, any garden-herbs for food]: having the nature and qualities of pot-herbs; used as an esculent pot-herb.

OLÉRON, *o-lā-rōng'*, Isle of (anc. *Uliarus*): island off the w. coast of France, forming part of the dept. of Charente-Inférieure: at one point it is less than a mile from the mainland. It is 19 m. long, about 5 m. broad; 59 sq. m.; and is unusually fertile. The people mostly are Protestants. On O. are the port Le Chateau, and the small towns St. Pierre d'O. and St. George's d'O.—Pop. of isle, 18,200.

OLÉRON, Laws of, or Jugements d'Oléron: famous code of maritime law compiled in France in the reign of St. Louis, and so named from a groundless story that it was enacted by Richard I. of England during the time that his expedition to Palestine lay at anchor at the Isle of Oléron. The real origin of these laws was a written code, *Il Consolato del Mare*, of about the middle of the 13th c., compiled either at Barcelona or at Pisa, forming the established usages of Venice and the other Mediterranean states, and acceded to by the kings of France and

counts of Provence. Besides containing regulations simply mercantile, this system defined the mutual rights of belligerent and neutral vessels, as they have been since understood in modern international law. The so-called laws of Oléron were a code of regulations borrowed from the *Consolato,* which for several centuries were adopted as the basis of their maritime law by all the nations of Europe. Copies of the *Jugements d'Oléron* are appended to some ancient editions of the *Coutumier de Normandie.* The code formed the basis of modern maritime law. It was published for the first time in the *Collections des Lois Maritimes* of M. Pardessus. An English translation was published as *Rutter of the Sea.* See NORMANDY, CUSTOMARY LAW OF.

OLEVIANUS, *ō-lē-vĭ-ā'nŭs* (Ger. *ō-lā-vē-â'nôs*), KASPER: German religious reformer: b. Treves 1536, Aug. 10; d. there 1587, March 15. He studied law in Paris, Orleans, and Bourges, where he became acquainted with the teachings of Calvin. Further theological learning was acquired by him in Geneva and he began to teach the Reformation doctrine in Treves in 1559, and to promote the spread of the new movement under the inspiration of Calvin. This roused the hostility of the archbishop, and the reformer was compelled to retire to Heidelberg, where he was appointed member of the church consistory, and court preacher. He now in collaboration with Ursinus produced the Heidelberg Catechism. His Lutheran sympathies led Louis VI. to depose him from his ecclesiastical preferments in 1576; and he went to Berleburg and thence in 1584 to Herborn, where he advocated the doctrines of the Reformation in the territories of Count von Wittgenstein and Nassau. His special contribution to the progress of the Reformation was of a practical and administrative character, and from him the Reformed churches received that Presbyterian type of organization and policy which has become permanent in Europe and America, where his method of government by synods has become universal. Consult: Harbaugh, *Fathers of the German Reformed Church;* Hagenbach, *Väter und Begründer der Reformierten Kirche* (1857).

OLFACTOMETER, *ŏl-făe-tŏm'ē-tẽr* [L. *olfactus,* pp. *of olfacere,* to smell; Gr. *μέτρον* measure]: an instrument designed to measure the intensity of stimulus required to produce an olfactory sensation. A description of the apparatus and its use will be found in Titchener's *Experimental Psychology, Students' Manual* (Qualitative), p. 80.

OLFACTORY, a. *ŏl-făk'tẽr-ĭ,* or OLFAC'TIVE, a. *-tĭv* [L. *olfactus,* a smelling, the sense of smell—from *olēre,* to smell; *factus,* made]: pertaining to smell; having the sense of smelling; used in smelling, as *olfactory* nerves.

OLFACTORY SENSATIONS: those conscious experiences which result when the sense organs of smell are

stimulated by the fine particles or effluvia given off by a variety of objects and carried by the air into the nasal passages. The sense of smell is a relatively late sense, being a closely related descendant of the sense of taste. The cells are situated in a small area of the mucous lining in the upper part of the nasal cavities. This sense is unique in that the sensory cells are on the surface and receive the stimulations directly. The sensations are of great variety and cannot be reduced to a limited number of fundamental qualities. Confusion very frequently arises between odors and tastes, because the relation between the two is so intimate in ordinary experience that the observer does not discriminate them at all. Thus the flavor of all substances is largely a matter of smell, not taste.

OLGA, *ol'ga*, SAINT: saint of the Russian Church, wife of Duke Igor of Kiev, who, having undertaken an expedition against Constantinople, which proved unsuccessful, was slain on his return to his own dominions. His widow Olga avenged his death, assumed the government in his stead, and for many years governed with much prudence and success. Having resigned the government to her son Vratislaf about 952, she repaired to Constantinople, where she was baptized by the patriarch Theophilaktes and received into the church, assuming at baptism the name of Helena, in honor of St. Helena, mother of Constantine. She returned to Russia, and labored with much zeal for the propagation of her new creed; but she failed in her attempt to induce her son, Swäntoslav, to embrace Christianity. Her grandson, Vladimir, having married Chrysoberga, sister of the emperors of Constantinople, Basil and Constantine, was baptized 988; but his grandmother did not live to enjoy this gratification, having died in 978, or, according to other authorities, as early as 970. She is held in high veneration in the Russian Church. Her festival is on July 21, and the practice of venerating her appears to date from the early period of the Russian Church before the schism between the Eastern and Western churches.

OLIBANUM, n. *ō-lĭb'ă-nŭm* [Ar. *ol*, or *al*, the; *luban*, frankincense: Gr. *libanos*, the frankincense-tree]: gum-resin of a bitterish taste, which flows from incisions made in *Boswellia serrata*, a tree found in parts of the East: see BOSWELLIA. It is the *Lebonah* of the Hebrews, *Libanos* or *Libanotos* of the Greeks, *Thus* of the Romans, of all which terms the ordinary English translation is *Frankincense* (q.v.). It occurs in commerce in semi-transparent yellowish tears and masses; has a bitter nauseous taste; is hard, brittle, and capable of being pulverized; and diffuses a strong aromatic odor when burned. It was formerly used in medicine, chiefly to restrain excessive mucous discharges; but that use is now rare. It sometimes enters as an ingredient into stimulating plasters. It is used chiefly for fumigation, and as incense in Rom. Cath. churches. It is

sometimes distinctively called *Indian O.;* a similar substance, in smaller tears, called *African O.*, being produced by *Boswellia papyrifera*, a tree growing on bare limestone rocks in e. Abyssinia, and sending its roots to a great depth into the crevices of the rock. The middle layers of the bark are of fine texture, and are used instead of paper for writing.

OLIFANT'S, *ŏl'ĭ-fants*, RIVER: name of two rivers in the Cape Colony.—The *Olifant's River West* rises in the Winterhoek Mountains, and enters the Atlantic lat. 31° 40′, after a course of 150 m., having a basin of drainage of 25,000 sq. m.—The *Olifant's River East* drains a great part of the dist. of George, and joins the Gauritz river 60 m. above the entrance of that river into the sea. Its course is more than 150 m., and it is more available for irrigation than almost any other Cape river.

OLIGÆMIA, n. *ŏl'ĭ-gē'mĭ-ă* [Gr. *oligos*, little; *haima*, blood]: in *med.*, that state of the system in which there is a deficiency of blood.

OLIGANDROUS, a. *ŏl'ĭ-găn'drŭs* [Gr. *olĭgos*, few; *aner* or *andra*, a male]. in *bot.*, having fewer than twenty stamens.

OLIGARCHY, n. *ŏl'ĭ-gâr-kĭ* [F. *oligarchie*—from Gr. *oligarchiă*, government in the hands of a few—from *olĭgŏs*, few; *archē*, rule, power]: a state in which the government is in the hands of a few; the rule of an aristocracy: in the Greek political writers, that perverted form of an aristocracy in which the rule of the dominant part of the community ceases to be the exponent of the general interests of the state, owing to the cessation of those substantial grounds of pre-eminence in which an aristocracy originated. The governing power in these circumstances becomes a faction, whose efforts are chiefly for their own aggrandizement and the extension of their power and privileges. OLIGARCH, n. *ŏl'ĭ-gârk*, one of a few in power OLIGAR'CHIC, a. *-gâr'kĭk*, or OL'IGAR'CHICAL, a. *-kĭ-kăl*, pertaining to government by a few.

OLIGIST, a. *ŏl'ĭ-jĭst*, or OL'IGIS'TIC, a. *-jĭs'tĭk* [Gr. *oligistos*, least—from *olĭgos*, few]: a term applied to specular iron ore—so called because less rich in metal than magnetite OL'IGIST, n. specular iron ore.

OLIGO, *ŏl'ĭ-gō*, or OLIG. *ŏl'ĭg* [Gr. *olĭgos*, few] a prefix in scientific terms, signifying 'few; small in number'

OLIGOCENE, n. *ŏl-ĭg'ō-sēn* [Gr. *oligos*, few; *kainos*, new or recent]: in *geol.*, a term employed to designate certain strata, because supposed to occupy an intermediate position between the Eocene and the Miocene age.

OLIGOCLASE, n. *ŏl-ĭg'ō-klāz* [Gr. *olĭgos*, few; *klasis*, a breaking or fracture], a triclinic soda-lime felspar so named in allusion to its peculiar fracture

OLIN, Henry: 1767–1837; b. R. I. He was a farmer in Vt.; with the exception of four years was a member of the legislature 1799–1825, and was a member of the constitutional conventions 1814, 22, and 28. He became associate judge of the court of Addison co. 1801, retained the position five years, was chief judge 1807 and 1810–24, in the latter year was elected to fill a vacancy in congress, and was lieut.gov. 1827–29. He died at Salisbury, Vt.

OLIN, *ō'lĕn*, Stephen, d.d., ll.d.: 1797, Mar. 2—1851, Aug. 16; b. Leicester, Vt.; son of Henry O. He graduated from Middlebury College 1820, was a teacher in S. C. three years, during which period he commenced preaching, connected himself with the Meth. Episc. conference of S. C. 1824, and preached in Charleston with great success for six months, when failing health compelled the relinquishment of his charge. He was prof. of belles-lettres in the Univ. of Ga. 1827–34, was ordained elder 1828, was pres. of Randolph Macon College, Va., 1834–37, resigning in the latter year on account of ill-health. After passing a year in Paris and travelling in various countries of the East, he returned to the United States with health much improved. He become pres. of Wesleyan Univ., Middletown, Conn., 1842, and held the position until his death. He was prominent in the general conference debates on slavery 1844, and was a delegate to the Evangelical Alliance two years later. As an educator he was very sueeessful, and he ranked among the first pulpit orators of his time. He published *Travels in Egypt, Arabia Petræa, and the Holy Land*, 2 vols.; and two baccalaureate sermons. *Greece and the Golden Horn*, and *College Life, its Theory and Practice*, were published after his death; and a number of sermons, lectures, and sketches appeared as *The Works of Stephen Olin*. His *Life and Letters*, edited by his wife, appeared in two vols., 1853. He died at Middletown, Conn.

OLINDA, *ō-lĭn'da* or *ō-lēn'dâ:* a city of Brazil, in the province of Pernambuco, and 4 m. n. e. from Pernambuco. It was formerly the capital of the province, and there were bloody contests between Spain and Holland for the possession of it. It is still a bishop's seat, Pernambuco being included in the diocese. The whole aspect of the town is that of a place half deserted. Pop. 8,000.

OLIO, n. *ō'lĭ-ō* [Sp. *olla*, a round earthen pot—from L. *olla*, a pot: It. *olla;* F. *oille*, an olio]: a rich Spanish dish composed of different kinds of meat; a mixture; a medley —applied to musical collections.

OLIPHANT, *ŏl'ĭ-fant*, Laurence: 1829–1888, Dec. 23; b. England; son of Sir Anthony O. He studied in England, spent several years in Ceylon, where his father held the office of chief justice, and went to Nepaul with Jung Bahadoor. He studied law at the Univ. of Edinburgh, was admitted to the Scottish and later to the English bar, but after a brief period of practice abandoned law for literature and travel. He attempted an exploration of Lapland, but the govt. officers objecting to its prosecution, he travelled

in Russia and obtained materials for a book on *The Russian Shores of the Black Sea.* He went to Canada, as private secretary of Lord Elgin, the governor-general; became superintendent of Indian affairs, aided Lord Elgin in securing the trade and fisheries treaty at Washington 1854, and after traveling in the south returned to England. He participated in and wrote a history of some of the expeditions of Omar Pasha, was private secretary of Lord Elgin in China and Japan 1857-59, and published an account of the mission; and was severely wounded while in the diplomatic service in Japan 1861. Oliphant was a member of parliament 1865-68; resigned in the latter year and joined The Brotherhood of the New Life, a spiritualistic organization at Portland, N. Y., of which he eventually became the head. He was correspondent of the London *Times* during the Franco-Prussian war, was connected with a telegraph cable company 1873-75, and afterward endeavored to colonize the Roumanian Jews in Palestine. In addition to vols. above noted, he published several works; among which are *Piccadilly; Irene McGillieuddy,* a satire on the manners of Americans; *The Land of Gilead;* and *Scientific Religion.*

OLIPHANT, Margaret (Wilson): distinguished English novelist: b. Wallyford, near Musselburgh, Scotland, 1828, April 4; d. Wimbledon, Surrey, England, 1897, June 25. She removed with her parents to Liverpool in childhood and in 1852 was married to her cousin, Francis Wilson Oliphant, an artist in stained glass, who died in 1859. In 1849, Mrs. Oliphant published her first work, *Passages in the Life of Mrs. Margaret Maitland of Sunnyside,* which won immediate attention and approval. Its most distinctive charm is the tender humor and insight which regulate its delineation of Scottish life and character. This work was followed by *Merkland* (1851); *Adam Graeme of Mossgray* (1852); *Harry Muir* (1853); *Magdalen Hepburn* (1854); *Lilliesleaf* (1855); and subsequently by *Zaidee, Katie Stewart,* and *The Quiet Heart,* which appeared first serially in *Blackwood's Magazine.* Though these are of various merit, talent is shown in all. They are rich in the detail dear to the womanly mind; have nice and subtle insights into character, a flavor of quiet humor, and frequent delicacy and pathos in treatment of the gentler emotions. It is, however, on the *Chronicles of Carlingford* that Mrs. Oliphant's first reputation as novelist was secured. In the first of the two sections separately published, the character of little Netty, the heroine, ranks as an original creation. The other, *Salem Chapel,* perhaps indicates a wider and more vigorous grasp than is found in any other work of this author. Certain of the unlovelier features of English dissent, as exhibited in a small provincial community, are here graphically sketched, and adapted with admirable skill to the purposes of fiction. In 1870, she published *Three Brothers;* 1871, *Squire Arden;* 1872, *Ombra;* 1874, *A Rose in June;* 1876, *Phœbe Junior;* 1878, *The Primrose Path;* 1879,

Within the Precincts. Also, *Life of Edward Irving; St. Francis of Assisi; Memoir of the Comte de Montalembert; The Makers of Florence; The Literary History of England,* from 1790 to 1825 ; (1882), *A Little Pilgrim in the Unseen* (on Spiritualism) ; and *Dante* and *Cervantes* in *Foreign Classics for English Readers.*

OLITORY, a. *ŏl'ĭ-tẽr-ĭ* [L. *olĭtor*, a kitchen-gardener]: belonging to or produced in a kitchen-garden.

OLIVAREZ, *o-lē-vâ'rāth*, Don Gasparo de Guzman, Count of, Duke of San Lucar: prime-minister of Philip IV. of Spain: 1587, Jan. 6—1645, July 12; b. Rome, where his father was ambassador. He belonged to a distinguished but impoverished family, received a good education, became the friend of Philip IV., his confidant in his amours, and afterward his prime-minister, in which capacity he exercised almost unlimited power for 22 years. Olivarez showed ability for government, but his constant endeavor was to wring money from the country that he might carry on wars. His oppressive measures caused insurrections in Catalonia and Andalusia, and roused the Portuguese to shake off the Spanish yoke 1640, and make the Duke of Braganza their king, an event which Olivarez reported to Philip with satisfaction, as it enabled him to confiscate the duke's great estates in Spain. But the arms of Spain being unsuccessful, the king was compelled to dismiss the minister.

OLIVE, n. *ŏl'ĭv* [F. *olive*—from L. *olīvă*, the olive-tree: It. *oliva*]: tree of Europe and Syria, much valued for its fruit and the oil obtained from it (see below) : the emblem of peace; a brownish-green color like the olive-fruit; Adj. of the color of the olive. Olivaceous, a. *ŏl'ĭ-vā'shŭs*, olive-green. Olivary, a. *ŏl'ĭv-ă-rĭ*, resembling an olive. Olive-brown, a color. Olive-crown, a reward given at the Olympic games. Olive-branch, the emblem of peace. Olive-oil, an oil obtained from the olive-fruit. Olive-yard, a garden or field where olives are cultivated. Ol'ivile, n. *-vĭl*, a starch-like substance obtained from the gum of the olive-tree. Ol'ivine, n. *-vĭn*, an olive-colored, semi-transparent mineral consisting of an anhydrous silicate of magnesia with iron, occurring in rounded grains and crystals in many basaltic rocks and lavas (see Chrysolite). Olivenite, n. *ŏl-ĭv'-ĕn-īt*, an arseniate of copper found in prismatic crystals and other forms, generally of a deep olive-green, sometimes brown or yellow. This mineral consists chiefly of arsenic acid and protoxide of copper, with a little phosphoric acid and a little water, and is found with different ores of copper. It is often crystallized in oblique four-sided prisms, of which the extremities are acutely bevelled, and the obtuse lateral edges sometimes truncated, or in acute double four-sided pyramids; it is sometimes also spherical, kidney-shaped, columnar, or fibrous. Olivinoid, n. *ŏl-ĭv'ĭn-oyd* [Gr. *eidos*, form, shape]; a substance occurring in meteorites resembling olivine.

OL'IVE (*Olea*): genus of trees and shrubs of nat. order *Oleaceæ;* having opposite, evergreen, leathery leaves, which are generally entire, smooth, and minutely scaly; small flowers in compound axillary racemes, or in thyrsi at the end of the twigs; a small 4-toothed calyx, a 4-cleft corolla, two stamens, a 2 cleft stigma; the fruit a drupe. The species are widely distributed in the warmer temperate parts of the globe. The COMMON O. (*O. Europæa*), native of Syria and other Asiatic countries, perhaps also of s. Europe, though probably it is there rather naturalized than indigenous, is in its wild state a thorny shrub or small

Common Olive (*Olea Europæa*):
a, fruit reduced; *b*, flower; *c*, flower with corolla and stamens removed to show the pistil.

tree, but through cultivation becomes a tree of 20–40 ft. high, destitute of spines. It attains a prodigious age. The cultivated varieties are very numerous, differing in the breadth of the leaves and in other characters. The leaves resemble those of a willow, are lanceolate, entire, of dull dark-green color above, scaly and whitish-gray beneath; the flowers small and white, in short dense racemes; the fruit greenish, whitish, violet, or even black, never larger than a pigeon's egg, generally oval, sometimes globular, or obovate, or acuminate. The fruit is produced in vast profusion, so that an old olive-tree becomes very valuable to its owner. It is chiefly from the pericarp that olive oil is obtained, not from the seed, contrary to the general rule of the vegetable kingdom. Olive oil is much used as food in the countries in which it is produced, and to a less extent in other countries, to which it is exported also for medicinal and other uses (see OILS). Olives, gathered before they are quite ripe, are pickled in various ways, being usually first steeped in lime-water, by which they are ren-

dered softer and milder in taste. They are well known as a restorative of the palate, and are said to promote digestion. Disagreeable in taste to many persons at first, they are soon greatly relished, and in s. Europe are even a considerable article of food. Dried olives are there used, as well as pickled olives. The wood of the olive-tree takes a beautiful polish, and has black cloudy spots and veins on a greenish-yellow ground; it is principally used for the finest purposes by cabinet-makers and turners. The wood of the root is marked in a peculiarly beautiful manner, and is used for making snuff-boxes and small ornamental articles. The bark of the tree is bitter and astringent; and both it and the leaves have febrifuge properties. A gum resin exudes from old stems, which much resembles storax, has an odor like vanilla, and is used in all parts of Italy for perfumery. Among the Greeks, the olive was sacred to Pallas Athene (Minerva), who was honored as the bestower of it; it was also the emblem of chastity. A crown of olive-twigs was the highest distinction of a citizen who had merited well of his country, and the highest prize of the victor in the Olympic games. An olive branch was also the symbol of peace (compare Gen. viii. 11); and the vanquished who came to supplicate for peace bore olive-branches in their hands. The olive has been cultivated in Syria, Palestine, and other parts of the East, from the earliest times. Its cultivation extends s. as far as Cairo, and n. to the middle of France. It is propagated generally by suckers, but where great care is bestowed on it, inarching is practiced. It grows from cuttings. The climate of England is too cold for the olive, though in Devonshire it ripens its fruit on a south wall. *Oleo similis* and several other species are useful trees of s. Africa, yielding a very hard and extremely durable wood. Some of them bear the name of IRONWOOD at the Cape of Good Hope. The AMERICAN OLIVE (*O. Americana*) also is remarkable for hardness of wood; it is found as far n. as Virginia, a tree of 30-35 ft. high, with much broader leaves than the common olive. Its fruit is fit for use, and its flowers are fragrant. The FRAGRANT OLIVE (*O. fragrans*, or *Osmanthus fragrans*) of China and Japan has extremely fragrant flowers, used by the Chinese for flavoring tea.

OL'IVER, ANDREW: American colonial official: b. Boston 1706, March 28; d. there 1774, March 3. He was graduated at Harvard College in 1724, was elected to the general court, and became secretary of the province. When the Stamp Act was passed by the English Parliament, he made himself obnoxious by accepting the office of distributer of stamps, and on 1765, Aug. 14, was hanged in effigy from the 'liberty tree.' In the evening of the same day, the mob cut down the effigy and burned it in front of Oliver's house. Oliver was so much alarmed that the next day he publicly resigned his office. In 1771 he was appointed lieutenant-governor. He was a brother-in-law of Governor Hutchinson, and pursued the same

public course, promoting, as far as possible, the designs of the British ministry. This was proved by his letters obtained by Franklin in England, and sent back to America in 1772. When, therefore, the general court petitioned the king for the removal of Hutchinson, Oliver's name was also included.

OLIVER, James, plow manufacturer and inventor of the chilled plow: b. Scotland 1823, Aug. 28; d. South Bend, Ind., 1908, March 2. He came to America in 1835 with his parents, who, after residing for a year in Seneca County, N. Y., settled in Mishawaka, Ind., in 1836. He learned the trade of a molder, and in 1855 began the manufacture of plows at South Bend, Ind., founding the establishment of which he was president. After years of exhaustive study and expensive experiments he invented the first successful chilled plow, which made his name famous throughout the world.

OLIVER, *ŏl'ĭ-vẽr*, Peter, ll.d.: 1713, Mar. 26—1791, Oct. 13. After graduating from Harvard College 1730, he entered public life. His home was in Middleborough, Mass., where he had an estate; and he held positions of various grades in Plymouth co. He had not attended a law school, but was appointed a justice of the supreme court 1756, and became chief-justice 1771. He was impeached and suspended from official service 1774 on account of his refusal to accept the salary offered by the colony and to decline any gift or payment from the crown. He made an unsuccessful attempt to hold court while under impeachment, became an avowed and ardent royalist, and on the evacuation of Boston by the British soldiers went to England, where he was pensioned by the government. He was given to antiquarian pursuits, was an able writer, and collected many papers of value regarding the Plymouth colony. The degree ll.d. was conferred on him by Oxford Univ. His works include a *Scriptural Lexicon* (2d ed. 1832), some political speeches, and a few poems. He died at Birmingham, England.

OL'IVES, Mount of, called also Mount Olivet: inconsiderable ridge on the e. side of Jerusalem, from which it is separated by only the narrow Valley of Jehosaphat. It is called by the modern Arabs Jebel-el Tur, and takes its familiar name from a magnificent grove of olive-trees which anciently stood on its w. flank, but has now in great part disappeared. The road to Mt. Olivet is through St. Stephen's Gate, and leads by a stone bridge over the now almost waterless brook Cedron. Immediately beyond, at the foot of the bridge, lies the Garden of Gethsemane; and the road here parts into two branches, n. toward Galilee, and e. to Jericho. The ridge rises in three peaks, the central one 2,556 ft. above sea level, 416 ft. above the Valley of Jehosaphat. The s. summit is now called 'the Mount of Offense,' and was the scene of the idolatrous worship established by Solomon for his foreign wives and concubines. The n. peak is the supposed scene of the appearance of the angels to the dis-

ciples after Christ's resurrection; and is remarkable in Jewish history as the place in which Titus formed his encampment in the expedition against the doomed city of Jerusalem. But it is around the central peak, the Mount of Olives properly so called, that all the most sacred associations of Christian history gather. On the summit stands the Church of the Ascension, built originally by St. Helen, the modern church being now in the hands of the Armenian community; and near it are shown, though with no historical authority, the various places where the Lord Jesus, according to tradition, wept over Jerusalem, where the apostles composed the Apostles' Creed, where the Lord taught them the Lord's Prayer, etc. Near the Church of the Ascension is a mosque and the tomb of a Mohammedan saint. In the Garden of Gethsemane, at the foot of the hill, is shown the scene of Christ's agony. The n. peak spreads out into a plain of considerable extent, painfully notable in Jewish history as the place where, after the Jews on occasion of the revolt under Bar-Kochebah were debarred by Adrian from entering Jerusalem, they were wont to assemble annually on the anniversary of the burning of the Temple to celebrate this mournful anniversary, and to take a distant look at their beloved and desecrated Jerusalem. The scene is beautifully described, and with much dramatic feeling, by St. Jerome.—*Com. in Sophoniam*, t. iii. 1665.

OLIVETANS, *ō-lĭv'ĕ-tănz:* religious order of the Rom. Cath. Ch., one of the many remarkable products of the spiritual movement which characterized the 12th and 13th c. The Olivetans, or Brethern of Our Lady of Mount Olivet, are an offshoot of the great Benedictine Order (q.v.), and derive their origin from John Tolomei, native of Siena, 1272. Tolomei had been a distinguished prof. of philosophy in the univ. of his native city; but his career was suddenly interrupted by the loss of his sight. Although he was cured of his blindness (and, as he himself believed, miraculously), this visitation convinced him of the vanity of earthly things; and in company with some friends he withdrew to a solitary place near Siena, where he devoted himself to prayer and religious exercises. By the direction of the pope, John XXII., the new brethern adopted the Benedictine rule; but they chose as their especial province the cultivation of sacred science and the duty of teaching. In 1319 Tolomei was chosen the first general; and in his lifetime the institute made rapid progress, especially in Italy. It numbered formerly 80 houses; but the number is now reduced to four—namely, the parent house, so called, of Monte Oliveto in the diocese of Arezzo in Tuscany, one at Rome, one at Genoa, and one at Palermo. The order has produced many distinguished ecclesiastics.

OL'IVINE: natural silicate of iron and magnesium ($Mg_2Fe_2SiO_4$), also called chrysolite, occurring in lava and as a principal constituent of basaltic rocks. It is

possibly an original magnesian component of rocks now altered to serpentine. Olivine is transparent, olive green or brown, with a colorless streak and conchoidal fracture.

OLLA, n. *ŏl'la* [Hind.]: a palm-leaf used in the East Indies for writing on with sharpened wood or metal.

OLLA, n. *ŏl'la*, or OL'LA-PODRI'DA, *-pŏ-drī'dă* [Sp. putrid mixture]: Spanish term, originally signifying an accumulation of remains of flesh, vegetables, etc., thrown together into a pot; but usually designating a favorite national dish of the Spaniards, consisting of a mixed stew and hash of different kinds of meat and vegetables. By the poorer classes this dish was sometimes kept so long, to be repeatedly served, as to acquire a bad smell: hence the name. Olla Podrida is figuratively applied to literary productions of very miscellaneous contents (see OLIO). The French equivalent is *pot-pourri*, and the Scotch *hotch-potch*, both of which are used also in a figurative sense.

OLLIVIER, *ō-lē-vē-ā*, OLIVIER EMILE: French statesman: b. Marseilles 1825, July 3. He studied law and began the practice of his profession at Paris in 1848. Having taken part in the revolution of 1848, he was appointed commissary-general at Marseilles under the republic, afterward becoming prefect at Bouches-du-Rhône and then of Haute-Marne. In 1857 he entered the legislative assembly, where he became one of the leaders of the Liberal opposition and was one of 'The Five' who were distinguished for eloquent and often successful opposition to the policy of Napoleon III. Gradually, however, he severed himself from his former political associates, and the severance was final when in January 1870, he accepted Napoleon's invitation to form a ministry. It was this ministry which declared war with Germany in July 1870, and was overthrown with disgrace in August 1870. Since then M. Ollivier has several times been a candidate for election to the Chamber of Deputies but without success. Beyond that he has taken no part in politics, but has devoted himself to writing works on legal and other subjects. These include *Lamartine* (1874); *Principes et Conduite* (1875); *L'Eglise et l'Etat au Concile du Vatican* (1879); *Thiers à l'Académie et dans l'Histoire* (1879); *Le Concordat, est-il respecté* (1883); *Nouveau Manuel de Droit Ecclésiastique Français* (1885); *Michel-Ange* (1892); *L'Empire Liberal* (6 vols., 1894-1908), a defense of his career; *Solutions Politiques et Sociales* (1894); and *Marie-Madeleine, Récits de Jeunesse* (1896). In 1870 he was elected a member of the French Academy.

OLMEDO, JOSÉ JOAQUIN, *hō-sā' hō-â-kēn ōl-mā'thō:* Ecuadorian poet: b. Guayaquil, Ecuador 1781, May 20; d. there 1847, Feb. 19. He was educated in Quito and Lima, taught law for a time in the University of Lima and then practised in his native city. He engaged actively in public affairs, was vice-president of Ecuador and governor of the department of Guaymas, and in 1845 led

a successful revolution against General Flores, but though he directed the provisional government he was defeated for the presidency. But his fame as a poet will outlast his political record, and few poets have been more widely read in South America than he. One of his best poems is a *Song to Bolivar* (1826). His *Collected Works* (Valparaiso, 1848; Paris, 1853; and Mexico, 1862) have been widely circulated. Consult: Herrera, *Apuntes biograficos de D. J. J. Olmedo* (1887).

OLMSTEAD, (*ŏm'stĕd or ŭm'sted*) CLAIM, The: in American history, a celebrated case in admiralty law. Originally it was a case of capture on the high seas, and involved questions of prerogative regarding which the decisions of the Federal commissioners were set at naught by a State Court of Admiralty. One Olmstead and others, of Connecticut, being pressed into British service aboard the sloop Active in 1777, took possession of the sloop, and were in turn captured by Houston, commanding the Pennsylvania armed brig Convention. The Pennsylvania State Court of Admiralty awarded a large share of prize money to the State, and to the officers and crew of the Convention, and the owners, officers and crew of a privateer which assisted in the capture. Olmstead and others appealed to the Federal commissioners of appeals and received a favorable verdict. This the Pennsylvania State court set aside and deposited the moneys with David Rittenhouse, state treasurer. His executrixes were sued in 1802 before the newly organized United States Supreme Court, and judgment was executed in favor of Olmstead and others, in 1809, against violent opposition from Pennsylvania.

OLMSTED, *ŏm'stĕd* or *ŭm'stĕd*, Charles Sanford, D.D.: American Protestant Episcopal bishop; b. Olmstedville, N. Y., 1853, Feb. 8. He was educated at St. Stephen's College, Annandale, N. Y., and the General Theological Seminary, New York, and was ordained priest in 1877. He was subsequently rector of St. Asaph's Church, Bala, Pa., and in 1902, May, was consecrated bishop of Colorado. He has published *December Musings*, verse (1898); *The Discipline of Perfection* (1902); *Essay on Mediæval Poets* (1904); etc.

OLMSTED, Charles Tyler, A.M., D.D.: American Protestant Episcopal bishop: b. Cohoes, N. Y., 1842, April 28. He was graduated from Trinity College, Hartford, Conn., in 1865, and after studying for the ministry at St. Stephen's College, Annandale, N. Y., took orders, was assistant in Trinity parish, New York, 1868-84; rector of Grace Church, Utica, N. Y., 1884-99; and vicar of St. Agnes Chapel, New York, 1899-1902. In 1902, October, he was consecrated bishop-coadjutor of the diocese of central New York, and became bishop 1904, July 11.

OLMSTED, Denison, LL.D.: 1791, June 18—1859, May 13; b. East Hartford, Conn. He graduated from Yale College 1813, was principal of a school in New London two years, tutor at Yale two years, and professor of

chemistry, mineralogy, and geology in the Univ. of North Carolina 1817-25; and made a geological survey of the state—the first of its kind. He was professor of natural philosophy and mathematics at Yale, 1825-36; and from 1836 till his death was professor of natural philosophy and astronomy. He was a close student, made careful observations and investigations, and useful inventions; and was author of text-books on astronomy and natural philosophy, which had immense sale. He published many scientific papers in the periodicals of the day. He died at New Haven.

OLM'STED, Frederick Law, A.M.: American landscape architect: b. Hartford, Conn., 1822, Apr. 26—1903, Aug. 28. He studied engineering and scientific agriculture at Yale College 1845-6, worked on a farm to study the methods of cultivation, and then settled on Staten Island. He was landscape gardener and supt. of the commission for laying out Central Park in New York 1856-61. With Calvert Vaux he drew the plan which in competition with 33 others was pronounced the best, and was followed in the construction of the park. During the civil war he was secretary of the U. S. Sanitary Commission, with headquarters at Washington. He was again chief architect of the Central Park 1872-78, and was also one of the principal designers of the Riverside and Morningside Parks in New York, the Washington and Jackson Parks in Brooklyn, and of public parks and grounds in Boston, Buffalo, Chicago, Montreal, Rochester, and other large cities. He managed the first survey of the Mariposa Grove and the Yosemite Park, was one of the commissioners of the Niagara Falls Reservation, and was also employed to beautify the Capitol grounds at Washington, the grounds of Amherst College and Harvard and Yale Universities, and other educational institutions. He was one of the founders of the American Museum of Natural History, and of the Metropolitan Museum of Art in New York. The degree A.M. was conferred on him by Harvard and Amherst. Among his works are: *Walks and Talks of an American Farmer in England; A Journey through Texas;* and *The Cotton Kingdom.*

OLMSTED, Frederick Law, Jr., American landscape architect: b. Staten Island, 1870, July 24. He graduated from Harvard, 1894, and studied landscape architecture under his father. He began practice in 1895, has been landscape architect for the metropolitan park system of Boston since 1898, and for the Vanderbilt estate at Biltmore, N. C., since 1896. He was instructor in landscape architecture at Harvard 1901-3, and since 1903 professor there. He was a member of the Washington (D. C.) Improvement Commission 1902. In 1904 he reported by request a plan for developing the public grounds of greater Baltimore, 1904. He wrote: *Park System of the District of Columbia* (1902); etc.

OLMSTED, John Charles, PH.B.: American land-

scape architect, nephew of F. L. Olmsted (q.v.): b. Geneva, Switzerland, 1852, Sept. 14. He was graduated from the Sheffield Scientific School of Yale University in 1875 and studied landscape gardening under his uncle. With his partners he has designed parks in Cambridge, Mass., Hartford, Conn., Newport, R. I., and elsewhere, and with F. L. Olmsted since 1875 has designed many parks and private country seats.

OLMUTZ, *ōl'müts:* city, ecclesiastical metropolis, and chief fortress of Moravia, Austria; cap. of the dist. of Olmutz; on an island of the river Moravia. Olmutz is the see of an archbishop, nominated by the chapter, and is the chief seat of the administrative departments. Its university, founded 1581, reorganized 1827, was reduced to a theological faculty 1855. Olmutz has a library of 75,000 vols.; good natural history, physical, and other museums; a gymnasium, an archiepiscopal seminary, artillery and infantry academies, polytechnic and other schools, a hospital, an asylum for widows and orphans, etc. The most noteworthy of its churches are the cathedral, a fine old building, and the church of St. Mauritius, completed 1412, with its famous organ, having 48 stops and more than 2,000 pipes. The noble town-hall, with its complicated clock-work, set up 1574, and the lofty column on the Oberring, with several fine fountains in the squares, and the splendid archiepiscopal palace and chapter house, all contribute to the picturesque aspect for which Olmutz is distinguished. The deficiency in public gardens has of late years been supplied in part by the draining and planting of some of the inner moats, and the conversion of portions of the fortifications into pleasure-grounds. A mile from the city lies the monastery of the Premonstratensians at Hradisch, founded 1074, now a military hospital. Olmutz has a few manufactories of kerseymere, cloth, linen, and porcelain, and is the seat of extensive trade in cattle from Poland and Moldavia. Prior to 1777, when Olmutz was raised into an archbishopric, its bishops had long held the rank of princes of the empire. The city suffered severely during the Thirty Years' War, and again in the Seven Years' War of Silesia, when it more than once fell into the hands of the Prussians. In 1848 Ferdinand I. signed his abdication here in favor of his nephew, Franz-Joseph I.; and 1850, Olmutz was chosen as the place of conference between the Prussian, Austrian, and Russian plenipotentiaries, especially in reference to the revolts in Hesse and Schleswig-Holstein against their rulers, the Elector of Hesse and the King of Denmark. By the mediation of Russia, Schleswig-Holstein was given to Denmark, and the Elector of Hesse was reinstated. Pop. (1900) 21,933.

OLNEY, *ŏl'nĭ*, JESSE: American geographer and educator: b. Union, Conn., 1798, Oct. 12; d. Stratford, Conn., 1872, July 31. In 1828 he published *A Geography and Atlas*, which was a standard work for 30 years, and effected a revolution in the methods of teaching geog-

raphy. He taught school in New York State and Hartford, Conn., sat in the Connecticut legislature for ten terms and in 1867 became State comptroller. He published *The National Preceptor* (1831); a series of textbooks (1831-52), including a series of *Readers*, a *Common School Arithmetic*, a *History of the United States*, and a volume of poems, *Psalms of Life*.

OLNEY, Richard, ll.d.: American lawyer and politician: b. Oxford, Mass., 1835, Sept. 15. He was graduated from Brown University in 1856 and from the Harvard Law School in 1858. In 1859 he was admitted to the bar and practiced law in Boston, being particularly successful as the chief counsel for the Boston & Maine and other railroads. In 1874 he was elected on the Democratic ticket to the Massachusetts legislature, but was not especially active in politics. In 1893 he was appointed attorney-general by President Cleveland, and was instrumental in breaking the railroad strike of 1894, by obtaining an injunction against the strikers from the United States circuit court of Illinois, enjoining them from interfering with interstate commerce and the United States mails. This injunction was enforced by the use of national troops, and was sustained by a decision of the Supreme Court, it being the first case of 'government by injunction' in case of a strike. In 1895 he became secretary of state, in which position he had charge of negotiations with England in regard to the boundary dispute with Venezuela; and wrote a remarkable official note, sustaining the right of the United States to interfere and giving a wide interpretation to the Monroe Doctrine. In 1896 he withdrew from the Democratic party on account of the free silver plank in the platform, but in 1900-08 he supported Bryan.

OLNEY: Ill., city, county-seat of Richmond County; on the Illinois C., the Baltimore & O. S. W. R.R.'s; about 115 miles east of Saint Louis. It was settled in 1843. It is in an agricultural region. The chief manufactures are flour, brick, and tile, and dairy products. It has a large trade in its manufactures, and in hay, seeds, and fruits. It has a sanatorium and a free public library. The government is vested in a mayor, who holds office two years, and a council. Pop. 4,400.

OLONETZ, *ō-lō-nĕts'*: government in n. Russia, bounded w. by Finland, e. and n.e. by Archangel; area, exclusive of water, 50,470 sq. m. Pop. (1897) 366,712. Large lakes abound in this govt., the chief, after Lake Onega (q.v.), being Lakes Wygo and Sego: in all more than 2,000 lakes are shown on the maps. The surface is in general elevated, nearly four-fifths of it covered with wood. The soil is sterile, and the climate cold and damp. The wealth consists principally in minerals. Its iron-mines supply the iron-works of Petrasowodsk, and from its quarries marbles are sent to St. Petersburg. The principal employments of the inhabitants, mostly Russians and Finns, and of the Greek Church, are carv-

ing in wood, fishing, and hunting. Many are employed also in the ironworks and quarries. The women weave and spin. The government derives its name from the small but ancient town of Olonetz. Petrasowodsk is the centre of administration.

OLYMPIA: Wash., city, capital of the State of Washington, county-seat of Thurston County; on Budds Inlet at the mouth of Deschutes River, and on the Northern Pacific railroad. The inlet is at the head of Puget's Sound, and the city has steamer communication with Tacoma, Seattle, Victoria, and other places on the Sound and on the Pacific coast. It was settled in 1846 and chartered as a city in 1859, the year Washington was admitted as a State. It is the commercial centre of a region in which there are extensive lumber and agricultural interests, also fishing and to some extent mining. Large quantities of oysters are shipped from Olympia. Deschutes River has here several falls, three quite large, which in all have a descent of about 85 feet. The waterpower contributes toward making Olympia a manufacturing city. The chief manufacturing establishments are lumber mills, salmon canneries, a brewery, iron works, machine shops, cooperages, and cold storage plants. It has an extensive trade in lumber and lumber products, and in farm products, fruits, its own manufactures, and oysters. The principal buildings are the State Capitol, built at a cost of $400,000, the county court-house, some of the bank buildings and business blocks. It has Saint Peter's Hospital (R.C.), Saint Amable Academy, public and parish schools, and the State Library, which contains nearly 30,000 volumes. Pop. (1900) 3,863; (1910) 6,996.

OLYM'PIA: scene of the celebrated Olympic Games (q.v.); a beautiful valley in Elis, in the Peloponnesus, through which runs the river Alpheus. As a national sanctuary of the Greeks, O. contained, within a small space, many of the choicest treasures of Grecian art belonging to all periods and states, such as temples, monuments, altars, theatres, and multitudes of images, statues, and votive-offerings of brass and marble. In the time of the elder Pliny there still stood here about 3,000 statues. The Sacred Grove (called the *Altis*) of Olympia inclosed a level space about 4,000 ft. long by nearly 2,000 broad, containing both the spot appropriated to the games and the sanctuaries connected with them. It was finely wooded, and in its centre stood a clump of sycamores. The Altis was crossed from w. to e. by a road called the 'Pompic Way,' along which all the processions passed. The Alpheus bounded it on the s., and its tributary the Cladeus on the w., and rocky but gently swelling hills on the n.; westward it looked toward the Ionian Sea. The most famous building was the *Olympieium*, or *Olympium*, dedicated to Olympian Zeus. It was designed by the architect Libon of Elis B.C. 6th c., but was not completed for more than a century. It contained a colossal statue of the god, the masterpiece of the

sculptor Phidias, and many other splendid figures; its paintings were the work of Panænus, a relative of Phidias. Next to the Olympieium ranked the *Heræum*, dedicated to Hera, wife of Zeus, and queen of heaven, containing the table on which were placed the garlands prepared for the victors in the games (see OLYMPIC GAMES), the *Pelopium*, the *Metroum*, the ten *Thesauri* or Treasuries, built for the reception of the dedicatory offerings of the Greek cities. There were also the temples of Eileithyia and Aphrodite. The *Stadium* and the *Hippodrome*, where the contests took place, stood at the e. end of the Altis. In 1875 explorations were undertaken by the German govt. for six years at an annual expense of about $40,000, and threw much light on the plans of the buildings. Many valuable sculptures, bronzes, coins, and other objects were discovered. The third vol. of *Excavations at Olympia* appeared 1879. The explorations were completed 1881, Mar. 20.

OLYMPIAD, n. *ō-lĭm'pĭ-ăd* [Gr. *olumpĭăs*, or *olum'pĭ-ăda;* L. *olympĭas*, or *olym'pĭădem*]: the period of four years that elapsed between two successive celebrations of the Olympic Games (q.v.); a mode of reckoning which forms the most celebrated chronological era among the Greeks. The first recorded O. dates from B.C. 776, July 21 or 22, and is frequently referred to as the O. of Corœbus; for historians, instead of referring to the O. by its number, designate it frequently by the name of the winner of the foot-race in the Olympic games belonging to that period, though at times both the number and the name of the victor are given. A slight indefiniteness is frequently introduced into Greek chronology, from the custom of mentioning only the O., neglecting to specify in which year of the O. a certain event happened. As this era commenced B.C. 776, the first year of our present era (A.D. 1) corresponded to the last half of the fourth year of the 194th with the first half of the first year of the 195th O., and A.D. 394 corresponds to the second year of the 293d O., at which time reckoning by olympiads terminated. This era is used only by writers, and is never found on coins, and very seldom on inscriptions. Another olympic era, known as the 'New Olympic Era,' was commenced by the Roman emperors, and dates from A.D. 131; it is found both in writings, public documents, and inscriptions. OLYM'PIAN, a. *-pĭ-ăn*, or OLYM'PIC, a. *-pĭk*, pertaining to Olympia or Olympus (q.v.). OLYM'PICS, n. plu. *-pĭks*, the Olympian games or chief public festivals of anc. Greece: see OLYMPIC GAMES.

OLYM'PIAS: wife of Philip II., King of Macedon; daughter of Neoptolemus I., King of Epirus, and mother of Alexander the Great: married to Philip II. B.C. 359; d. B.C. 316. She possessed a vigorous understanding, but was most passionate, jealous, and ambitious. Philip having, on account of disagreements, separated from her and married Cleopatra, niece of Attalus (B.C. 337), she went to reside with her brother Alexander, King of Epirus, where she incessantly fomented intrigues against her former husband, and is believed to have taken part in his assassination by Pausanias, B.C. 337. On the accession of her son Alexander

to the throne, she returned to Macedonia, where she contributed to the murder of her former husband's second wife Cleopatra, and her daughter. Alexander was filled with indignation, but O. was his mother, and he could not obey the dictates of justice. During his brief but magnificent career he always treated her with reverence, though he never allowed her to meddle with his political schemes. After his death she endeavored to get possession of the vacant throne, and obtained the support of Polysperchon in her designs. B.C. 317, the two defeated Arrhidæus, the weak-minded step-brother and successor of Alexander, and his wife Eurydice, whom O. caused to be put to death the same year. She then began to revenge herself on those Macedonian nobles who had shown themselves hostile to her; but her cruelties soon alienated the people from her, though she was the mother of their heroic king; whereupon Cassander (q.v.), her principal adversary, marched north from the Peloponnesus, besieged her in Pydna, and forced her to surrender in the spring of B.C. 316. She was immediately put to death.

OLYMPIC GAMES: the most splendid national festival of the ancient Greeks; celebrated every fifth year in honor of Zeus, the father of the gods, on the plain of Olympia (q.v.). Their origin goes back into prehistoric ages. According to the myth elaborated or preserved by the Elean priests, they were instituted by the Idæan Herakles in the time of Kronos, father of Zeus; according to others, by the later Herakles, son of Zeus and Alkmene; while Strabo, rejecting the older and more incredible legends, attributes their origin to the Herakleidæ after their conquest of the Peloponnesus. But the first glimpse of anything approaching historic fact in connection with the games is their so-called revival by Iphitos, King of Elis, with the assistance of the Spartan lawgiver, Lycurgus, about B.C. 884; or, according to others, about B.C. 828, an event commemorated by an inscription on a disk kept in the *Heræum* at Olympia, which Pausanias saw in the 2d c. That festive games were celebrated here, in other words, that Olympia was a sacred spot, long before the time of Iphitos, can hardly be doubted: the universal tradition that the Elean king had only 'revived' the games proves this; but nothing whatever can be historically ascertained concerning their origin, character, or frequency, in this remoter time. Iphitos may, therefore, be regarded as their founder, yet the reckoning of time by Olympiads (q.v.)—the real dawn of the historical period in Greek history—did not begin till more than a century later. At first, it is conjectured, only Peloponnesians resorted to the O. G., but gradually the other Greek states were attracted to them, and the festival became *Pan-Hellenic*. Originally, and for a long time, none were allowed to contend except those of pure Hellenic blood; but after the conquest of Greece by the Romans, the latter sought and obtained this honor, and both Tiberius and Nero figure in the list of Roman victors. Women—with one exception, the priestess of Demeter Chamyne—were forbidden to be present, on pain of being thrown headlong from the Typæan Rock. The

games were held from the 11th to the 15th of the Attic month *Hekatombaeon* (our July—Aug.), during which first throughout Elis, then throughout the rest of Greece, heralds proclaimed the cessation of all intestine hostilities; while the territory of Elis itself was declared inviolable. The combatants were required to undergo a preparatory training for ten months in the gymnasium at Elis, and during the last of these months the gymnasium was almost as numerously attended as the games themselves. Much uncertainty prevails as to the manner in which the contests were distributed over the different days. Krause (*Olympia*, p. 106) suggests the following order: On the first day the great initiatory sacrifices were offered, after which the competitors were properly classed and arranged by the judges, and the contests of the trumpeters took place; the second day was set apart for the boys who competed with each other in foot-races, wrestling, boxing, the pentathlon, the pankration, horse-races; the third and principal day was devoted to the contests of men in foot-races of different kinds (e.g., the simple race, once over the course; the *diaulos*, in which the competitors had to run the distance twice; and the *dolichos*, in which they had to run it seven or twelve times); wrestling, boxing, the *pankration* (in which all the powers and skill of the combatants were exhibited), and the race of *hoplites*, or men in heavy armor; on the fourth day came off the *pentathlon* (contest of five games—viz., leaping, running, throwing the discus, throwing the spear, and wrestling), the chariot and horse races, and perhaps the contests of the heralds; the fifth day was set apart for processions, sacrifices, and banquets to the victors (called *Olympionikoi*), who were crowned with a garland of wild olive twigs cut from a sacred tree which grew in the Altis (see OLYMPIA), and presented to the assembled people, each with a palm branch in his hand, while the heralds proclaimed his name, and that of his father and country. On his return home he was received with extraordinary distinction: songs were sung in his praise (14 of Pindar's extant lyrics are devoted to *Olympionikoi*); statues were erected to him, both in the Altis and in his native city; a place of honor was given him at all public spectacles; he was in general exempted from public taxes, and at Athens was boarded at the expense of the state in the Prytaneion.

The regulation of the games belonged to the Eleans, from whom were chosen the *hellanodikai*, or judges, whose number varied. At first there were only two, but as the games became more and more national, consequently more numerous, they were gradually increased to 10, sometimes even to 12. They were instructed in their duties for ten months beforehand at Elis, and held their office only one year. The officers who executed their commands were called *alytai*, and were under the presidency of an alytarch.—See Krause's *Olympia oder Darstellung der grossen olympischen Spiele* (1838) and Bötticher's work (1882).

OLYMPIODORUS, *ō-lĭm-pĭ-ō-dō'rŭs:* one of the latest of the Alexandrian Neo-Platonists; in the first half of the 6th c. after Christ, during the reign of Emperor Justinian. Regarding his life nothing is known. Of his writings, there remains a *Life of Plato*, with commentaries or scholia on several of his dialogues, the Gorgias, Philebus, Phædo, and Alcibiades I. In these O. appears as an acute and vigorous thinker, and as a man of great erudition.—Another O., of the Peripatetic school, lived in Alexandria, B.C. 5th c., and was the teacher of Proclus (q.v.).—A third O., from Thebes in Egypt, wrote a history in the first half of the 5th c. after Christ.

OLYMPIONIC, *ō-lĭm-pĭ-ŏn'ĭk* [Gr. *olumpionikēs*—from *Olumpus*, Olympus; *nikē*, victory]: an ode in honor of a victor in the Olympic games.

OLYMPUS, *ō-lĭm'pŭs:* ancient name of several mountains or chains of mountains—e.g., of the northwestern continuation of Taurus in Mysia, of a mountain in the island of Cyprus, of one in Lycia, of another in Elis, of one on the borders of Laconia and Arcadia, of another on the frontiers of Thessaly and Macedonia. Of these, the last-mentioned (now called *Elymbo*) is the most famous. Its e. side, which fronts the sea, is composed of a line of vast precipices, cleft by ravines, filled with forest-trees. Oak, chestnut, beech, plane tree, are scattered abundantly along its base, and higher up appear great forests of pine, as in the days of the old poets of Greece and Rome. With Euripides, it is *poludendros Olympos;* with Virgil, *frondosus Olympus;* and with Horace, *opacus Olympus.* Its highest peak is 9,754 ft. above sea-level, and is covered with snow about nine months of the year. It was regarded by the ancient Greeks as the chief abode of the gods, and the palace of Zeus was supposed to be upon its broad summit of naked rock. According to Greek legend, it was formerly connected with Ossa, but was separated from it by an earthquake, allowing a passage for the Peneius through the narrow vale of Tempe to the sea. The philosophers afterward transferred the abode of the gods to the planetary spheres, to which they likewise transferred the name Olympus.

OM, *ōm:* Sanskrit word which, on account of the mystical notions that even at an early date of Hindu civilization were connected with it, acquired much importance in the development of Hindu religion. Its original sense is that of emphatic or solemn, affirmation or assent. Thus, when in the White-Yajur-Veda (see VEDA) the sacrificer invites the gods to rejoice in his sacrifice, the god Savitr'i assents to his summons by saying: '*Om* (i.e., be it so); proceed!' Or, when in the Br'ihad-âranyaka-Upanishad, Prajâpati, father of gods, men, and demons, asks the gods whether they have understood his instruction; he expresses his satisfaction with their affirmative reply, in these words: '*Om*, you have fully comprehended it;' and, in the same Upanishad, Pravâhan'a answers the question of S'wetaketu, as to whether his father has instructed him, by uttering the word '*Om*,' i.e., 'forsooth (I am).' In this, the original sense of the word, it is little doubtful that *om* is but an older and contracted form of the common Sanskrit word *evam*, 'thus,' which, coming from the pronominal base '*a*'—in some derivations changed to '*e*'—may have at one time occurred in the form *avam*, when, by the elision of the vowel following *v*—for which there are numerous analogies in Sanskrit—*avam* would become *aum*, and hence, according to the ordinary phonetic laws of the language, *om*. This etymology of the word, however, seems to have been lost, even at an early period of Sanskrit literature; for another is found in the ancient grammarians, enabling us to account for the mysticism which many religious and theological works of ancient and mediæval India suppose to inhere in it. According to this latter etymology, *om* would come from a radical *av* by means of an affix *man*, when *om* would be a curtailed form of *avman* or *oman;* and as *av* implies the notion of 'protect, preserve, save,' *om* would be a term implying 'protection or salvation;' its mystical properties and its sanctity being inferred from its occurrence in the Vedic writings, and in connection with sacrificial acts, such as are alluded to before.

Hence *Om* became the auspicious word with which the spiritual teacher had to begin, and the pupil had to end each lesson of his reading of the Veda. 'Let this syllable,' the existing Prâtis'âkhya, or grammar of the R'igveda, enjoins, 'be the head of the reading of the Veda, for, alike to the teacher and the pupil, it is the supreme Brahman, the gate of heaven.' And Manu (q.v.) ordains: 'A Brahman, at the beginning and end (of a lesson on the Veda), must always pronounce the syllable *Om;* for unless *Om* precede, his learning will slip away from him; and unless it follow, nothing will be long retained.'

A reason for the mysterious power attributed to this word is given by Manu himself. 'Brahmâ,' he says, 'extracted from the three Vedas the letter *a*, the letter *u*, and the letter *m* (which combined result in *Om*), together with the (mysterious) words *Bhûh'* (earth), *Bhuvah'* (sky), and *Swah'* (heaven);' and in another verse: 'These three great immutable words, preceded by the syllable *Om*, and

(the sacred R'igveda verse, called) Gâyatrî, consisting of three lines, must be considered as the mouth (or entrance) of Brahman (the Veda)'—or, as the commentators observe —the means of attaining final emancipation. . . . All rites ordained in the Veda, such as burnt and other sacrifices, pass away; but the syllable *Om* must be considered as imperishable, for it is (a symbol of) Brahman (the supreme Spirit) himself, the Lord of Creation.' In these speculations, Manu agrees with several Upanishads. See VEDA. According to the Mân'd'ûkya-Upanishad, the nature of the soul is summarized in the three letters *a*, *u*, and *m*, in their isolated and combined form—*a* being Vais'wânara, or that form of Brahman which represents the soul in its waking condition; *u*, Taijasa, or that form of Brahman which represents it in its dreaming state; and *m*, Prâjna, or that form of Brahman which represents it in its state of profound sleep (or that state in which it is temporarily united with the supreme Spirit); while *a*, *u*, *m* combined, i.e., Om, represent the fourth or highest condition of Brahman, 'which is unaccountable, in which all manifestations have ceased, which is blissful and without duality. *Om*, therefore, is soul; and by this soul, he who knows it enters into (the supreme) soul.' Passages like these may be considered as the key to the more enigmatic expressions used, for instance, by the author of the *Yoga* (q.v.) philosophy, where, in three short sentences, he says: 'His (the supreme Lord's name) is *Pran'ava* (i.e., *Om*); its muttering (should be made) and reflection on its signification; thence comes the knowledge of the transcendental spirit, and the absence of the obstacles' (such as sickness, languor, doubt, etc., which obstruct the mind of an ascetic). Other puerile and absurd explanations were grafted on these three letters, to serve special purposes—each sect, of course, identifying the combination of these letters, or Om, with its supreme deity. Thus, also, in the Bhagavadgîtâ, which is devoted to the worship of Vishn'u in his incarnation as Kr'ishn'a, though it is essentially a poem of philosophical tendencies, based on the doctrine of the Yoga, Kr'ishn'a in one passage says of himself that he is *Om;* while in another passage he qualifies the latter as the supreme Spirit.—Although *Om*, in its original sense, as a word of solemn or emphatic assent, is, properly speaking, restricted to the Vedic literature, it is now often used by the natives of India in the sense of 'yes,' without, of course, any allusion to the mystical properties ascribed to it in the religious works. See OM MAN'I PADME HÛM', below.

The etymology as above given seems to set aside completely the supposition of some writers as to a connection between *Om* and *Amen*. Though the derivation of *Om*, as a curtailment of *av-man*, from *av*, 'protect, save,' is probably merely artificial, and, as stated before, invented to explain the later mystical use of the Vedic word, it seems more satisfactory to compare the Latin *omen* with a Sanskrit *avman*, 'protection,' as derived by the grammarians from *ăv* (in the Latin *ăve-o*), than to explain it in the fashion of the Roman etymologists: 'Omen,

quod ex ore primum elatum est, osmen dictum;' or, 'Omen velut oremen, quod fit ore augurium, quod non avibus aliove modo fit.' And since *pra-nava*, from Sanskrit *nu*, 'praise,' is, like *Om*, used in the sense of 'the deity,' it is likewise probable that *numen* does not come, as is generally believed, from Latin *nu-(ere)*, 'nod,' but from a radical corresponding with the Sanskrit *nu*, 'praise.'

Om Man'i Padme Hûm': the 'formula of six syllables' which has acquired celebrity from its conspicuous place in the religion of the Buddhists, and especially in that form of it called *Lamaism* (q.v.). It is the first subject which the Tibetans and Mongols teach their children, and it is the last prayer muttered by the dying man; the traveller repeats this formula on his journey, the shepherd when attending his flock, the housewife when performing her domestic duties, the monk when absorbed in religious meditation, etc. It is seen everywhere; on flags, rocks, trees, walls, columns, stone-monuments, domestic implements, skulls, skeletons, etc. It is deemed the essence of all religion and wisdom, and the means of attaining eternal bliss. 'These six syllables,' it is said, 'concentrate in themselves the favor of all the Buddhas, and they are the root of the whole doctrine . . . . : they lead the believer to re-birth as a higher being, and are the door which bars from him inferior births; they are the torch which illuminates darkness, the conqueror of the five evils;' etc. They are likewise the *symbol* of transmigration; each syllable successively corresponding with, and releasing from, one of the six worlds in which men are reborn; or they are the mystical designation of the six transcendental virtues, each successive syllable implying self-offering (*dâna*), endurance (*kshânti*), chastity (*s'îla*), contemplation (*dhyâna*), mental energy (*vîrya*), and religious wisdom (*prajnâ*). The reputed author of this formula is the Dhyâni-Bodhisattwa, or deified saint, *Avalokites'wara*, or, as the Tibetans call him, *Padmapân'i* (i.e., the lotus-handed). It would not belong, accordingly, to the earliest stage of Buddhism, nor is it found in the oldest Buddhistic works of n. India or of Ceylon. Its original sense is obscure; one perhaps probable interpretation is: 'Salvation (*om*) [is] in the jewel-lotus (*man'i-padme*), amen (*hûm'*);' when the compound word 'jewel-lotus' would mean the saint Avalokites'wara and the flower whence he arose. If this interpretation be correct, the formula was originally nothing more than a salutation addressed to a saint; and the mystical interpretation put on each syllable of it was analogous to that which imparted a transcendental sense to each of the letters of the syllable Om. Dr. Emil Schlagintweit, in *Buddhism in Tibet* (Leipzig 1863), relates (p. 120) that 'in a prayer-cylinder which he had the opportunity of opening, he found the formula printed in six lines, and repeated innumerable times upon a leaf 49 ft. long and 4 inches broad. When Baron Schilling de Canstadt paid a visit to the temple Subulin, in Siberia, the Lamas were just occupied with preparing 100,000,000 of copies of this prayer to

be put into a prayer-cylinder; his offer to have the necessary number executed at St. Petersburg was readily accepted, and he was presented, in return for the 150,000,000 of copies that he forwarded to them, with an edition of the Kanjur, the sheets of which amount to about 40,000. When adorning the head of religious books, or when engraved upon the slabs resting on the prayer-walls, the letters of the formula are often so combined as to form an anagram: the power of this sacred sentence is supposed to be increased by its being written in this form. These anagrams are always bordered by a pointed frame indicating the leaf of a fig-tree.'—See also E. Burnouf, *Introduction à l'Histoire du Buddhisme Indien* (Paris 1844); C. F. Koeppen, *Die Religion des Buddha* (Berlin 1857-59); and the works quoted by these authors.

-OMA: termination of many medical terms, signifying a tumor, as in sarcoma, fibroma.

OMAGH, *ō'mâ*, locally *ō-mâ^{c}h'* (Irish, *Oigh magh*, 'seat of the chiefs'): ancient town, cap. of county Tyrone, Ireland; on the river Strule. 34 m. s. from Londonderry, 110 m. n.n.w. from Dublin, with both which cities it is connected by railway. Omagh grew up around an abbey founded 792, but is heard of first as a fortress of Art O'Nial in the end of the 15th c., about which time it was forced to surrender to the English, though its possession long continued to alternate between Irish and English hands. It formed part of James I.'s 'Plantation' grants, and was strongly garrisoned by Mountjoy. On its evacuation by the troops of James II., 1689, it was partially burned; and a second fire, 1743, completed its destruction. But it has been well rebuilt, and is now a neat and prosperous town. Pop. 5,000. Omagh contains a very handsome court-house, where the assizes for county Tyrone are held; and several churches. Its trade is chiefly in brown linens, corn, and agricultural produce.

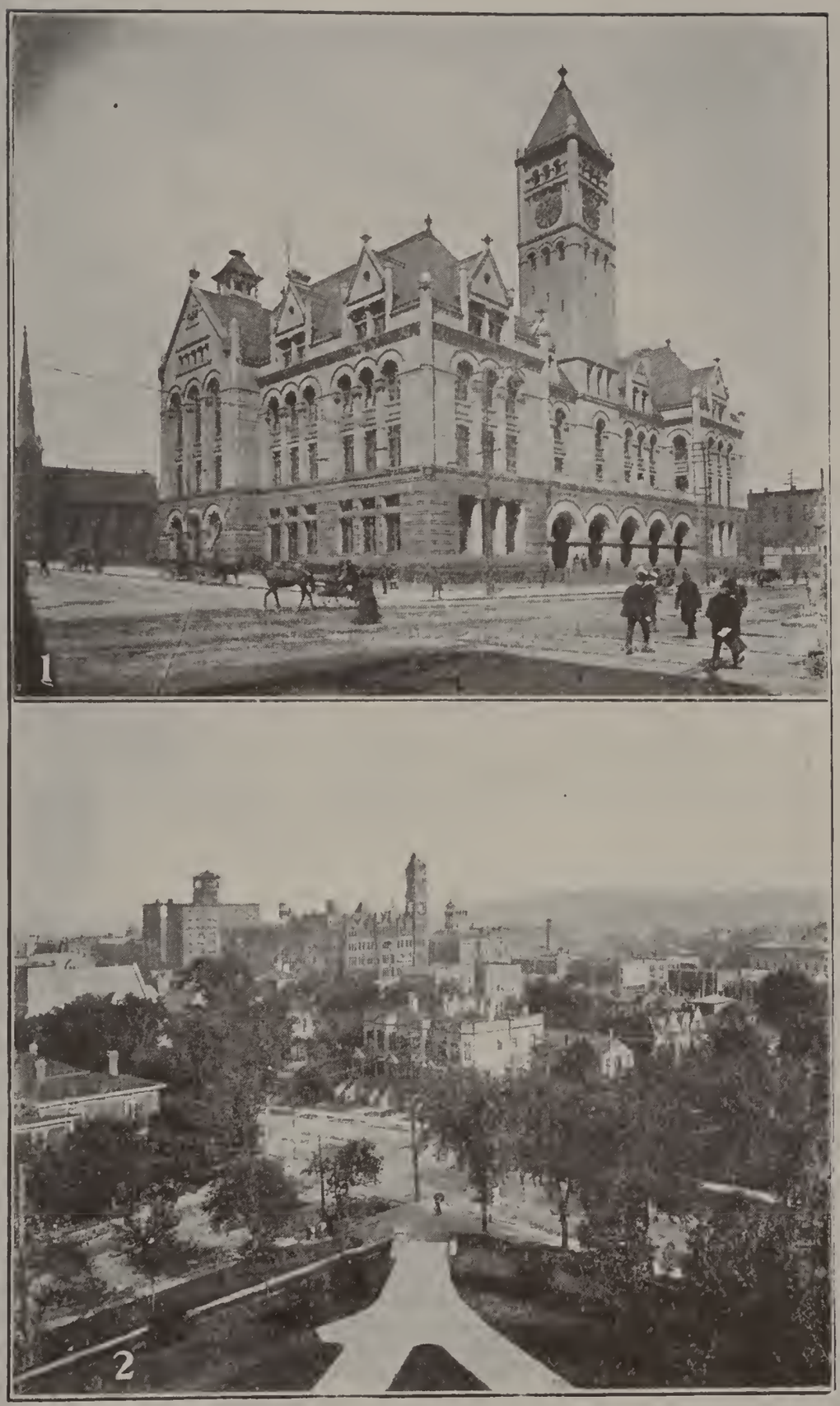
OMAGRA, n. *ŏm'a-gra* [Gr. *ōmos*, the shoulder; *agra*, a seizure]: in *pathol.*, gout in the shoulder; pain in the shoulder.

OMAHA, *ō'ma-ha:* Neb., the largest city in the State and county-seat of Douglas County, is situated on a sightly eminence on the west bank of the Missouri River, 600 miles from its confluence with the Mississippi.

Railroads.—The geographical position makes Omaha a natural railroad centre. Fourteen great trunk systems, with lines connecting to every part of our country, enter the city, thus bringing it into communication with all parts of the Union. No western city has greater railroad facilities. Within the past few years two magnificent railway stations have been erected, the Union depot at a cost of $400,000, and the Burlington costing $500,000. The Missouri River is spanned at Omaha by two railroad bridges, and one motor and wagon bridge.

Trade and Commerce.—Over 300 firms, covering every line of mercantile industry, are engaged in wholesale and jobbing. Omaha is a port of immediate transporta-

OMAHA.



1. Postoffice.
2. View of City from High School Building.

tion of foreign goods, which has permitted the merchants to receive merchandise and pay duties at home without the delay on the seaboard. The value of the jobbing business is annually about $95,000,000. The value of productions of factories, industry, packing houses and smelters is annually over $105,000,000. At South Omaha are located the famous packing houses and stockyards, where more than $30,000,000 have been invested. The daily capacity of killing and preparing for market is 15,000 hogs, 5,000 cattle, and 4,000 sheep. All meats are subjected to careful investigation and chemical analysis by government inspection before shipping.

Industries.—There are many and diversified industries in Omaha. The first brewery was established in 1859 by Fred Krug, who has remained in the business, and is president of the Frederick Krug Brewing Company, with a capital of $1,000,000. The cost of their present building and machinery was $750,000; capacity 200,000 barrels yearly. The Metz Bros. Brewing Company commenced operations in 1864, and occupy a building erected at a cost of $351,000. The Omaha Brewing Association was organized May 1891, with a capital stock of $1,000,000. The brewery buildings, etc., cost $500,000; capacity 150,000 barrels. The Willow Springs Distillery was incorporated in 1872 and is now the third largest establishment of the kind in the United States.

The American Smelting and Refining Company commenced business in October 1870 with a capital of $60,000. In 1882 the Grant Smelting Company was consolidated with the Omaha Company. A reorganization was completed with a capital of $2,500,000. They handle silver, lead, copper, ores, from the western States, Mexico and British possessions. Omaha is in the centre of the great wheat and corn producing portions of Iowa, Nebraska, Kansas, and Missouri, and the largest cattle and hog productions of the country, are marketed here.

Public Parks.—The chief suburban attractions of the city are its parks, seven in number, which are connected by a boulevard system. Hanscom Park, the oldest, contains 60 acres. Riverview, in the bluffs overlooking the Missouri, contains 70 acres. Bemis Park contains 10 acres; Elmwood contains 215 acres; Miller Park, 80 acres, and Fontenelle Park, 110 acres. Prospect Hill Cemetery is located in the northwest part of the city on high and eligible ground. Forest Lawn is situated seven miles northwest of business centre of city; others are Mount Hope Cemetery, Jewish Cemetery, Bohemian, Ever-Green, Springwell, Holy Sepulchre, Saint Mary's and Cassidy's Roman Catholic Cemeteries.

Buildings.—The Douglas County Court House, a stone structure in Farnum Street, was completed in 1885 and cost about $225,000. The Omaha *Bee* building was completed in 1889, an imposing substantial building of stone and pressed brick, seven stories in height, covering an area of 132 square feet. The New York Life Insurance

Co. building, a ten-story edifice of brick and stone, is one of the landmarks of the city, and was erected at an expense of $1,000,000. The Paxton Block was completed in 1888 at a cost of $361,000; in the same year the Barker Block and Granite Block were erected at a cost respectively of $70,000 and $40,000. Boyd's Theatre is a structure of stone, iron and pressed brick, has a seating capacity of 2,000 and cost $250,000. The City-hall, seven stories in height, the home of all the city officers, was erected at a cost of $550,000. The United States Custom-house, Post-office and Court-house, was commenced in 1892, and completed at an expense of $1,845,000. It is of the Romanesque style of architecture. The main entrance is on 16th Street, with a loggia 15 by 50 feet enclosed by a balustrade, and has a façade of five arches, embellished by polished granite pillars.

Churches.—Omaha is the see of the Roman Catholic and of the Protestant Episcopal churches. The latter has a fine stone cathedral building costing $60,000, with a chime of eight bells. There are in the city, 9 Baptist organizations; 3 Christian; 8 Congregational; 6 Evangelical; 1 Free Methodist; 3 Hebrew synagogues; 12 Lutheran; 13 Methodist Episcopal; 14 Presbyterian; 10 Protestant Episcopal; 2 United Presbyterian; 12 Roman Catholic; 1 Unitarian; 1 Christian Scientist; 1 Latter Day Saints; 1 Seventh Day Adventist; 1 Salvation Army; 1 Volunteers of America; 1 Universalist.

Libraries.—The libraries are those of the New York Life Insurance Company, Law Library (2,500 volumes); Omaha Public Library (65,000 volumes); the library of Young Men's Christian Association: two Catholic libraries at Creighton College, one for the use of the faculty (8,000 volumes, being composed in part of rare and old books and manuscripts of the 15th, 16th, and 17th centuries); the other for the use of the students (12,000 volumes). The Masons, Odd Fellows, Swedish, Danish, and Bohemian societies all have valuable libraries. In October 1888 G. W. Lininger erected an art gallery in the Italian renaissance style, at a cost of $15,000, in which to house his collection of paintings and other works of art. The present collection is valued at over $300,000.

Public Schools.—The schools of the city are under the control of the board of education, consisting of 15 members elected by the votes of the citizens. Women paying taxes and those who have children of school age vote for the members of the board. The superintendent is appointed by the board. There are 50 school buildings in the city, 49 graded and 1 high school, costing in the aggregate $1,500,000. In addition to the public schools there are many private and parochial schools.

Charities.—These institutions include the Creche, the Childs Savings Institute, Immanuel Orphan Home, Clarkson Memorial Hospital, Convent of Mercy, County Hospital, the Nebraska Institute for the Deaf, and the Roman Catholic Orphan Asylum, Saint Joseph's Hospital of three stories and basement and costing $150,000, is

known as 'The Creighton Memorial,' the name of its chief donor. The Bishop Clarkson Memorial Hospital was established in 1881, and its new building was completed in 1884.

Banks.—According to the latest reports there are 10 National banks in the city with capital of $4,100,000, and deposits of $32,891,034.02.

Government.—The city is divided into nine wards, the government being confided to a mayor, city council, composed of two aldermen from each ward, an advisory board of eight members, board of public works (three members), board of public health (four members), park commission (five members), and board of fire and police, with five members.

History.—Although a superficial survey of the city had been made in 1853, June, no attempts were made toward a permanent survey. The Indian title had not been extinguished, and the Indians were very tenacious of their rights, and viewed with suspicion all the movements of the white men. It was not until 1854, March, that a treaty was concluded with the Otoes, Missouris and Omaha Indians, ratified June 21, and promulgated June 24, whereby the title of the Indians was surrendered, and left the land to be taken up and enjoyed by the white man. In the spring of 1854 some settlers arrived and the first building was erected. The first general election in the Territory was held 1854, Dec. 20, and on 1855, Jan. 16, the first Legislative Assembly was convened at Omaha, and on January 24 commenced a contest (which lasted for 12 years), when the member from Cass County gave notice that, at an early day, he would introduce a bill to locate the capital of Nebraska. The struggle was long and bitter, often at the expense of needed legislation, producing much ill feeling, and was more troublesome to manage than any question the Legislature had been called upon to decide. After a long debate upon the proposition of the member from Cass, the question was decided in favor of Omaha by a vote of 14 to 11 in the lower house, only to be renewed at every subsequent meeting of the Legislature, until Nebraska became a State, when the capital was removed to Lincoln. On 1857, Feb. 2, by an act of the Legislature, Omaha became an incorporated city, it having been up to this time a county organization, and an election was held on the first Monday in March in that year, when a mayor, nine aldermen and other city officers were elected. The council held its first session March 6.

The discovery of gold in Colorado in 1858 made Omaha the best point for outfitting for the mines. The streets were filled with emigrants on the way to the gold fields, and daily trains left to cross the plains in search of gold. At the breaking out of the Civil War Omaha was made military headquarters, which greatly increased its business and importance. Since that time Omaha has grown from a city of 320 blocks to one of 24 square miles. Pop. (1900) 102,553; (1910) 124,096.

OMAHAS, *ō'ma-hawz:* tribe of N. American Indians belonging to the Dakota family. Marquette alludes to them on his map, 1673, and Carver visited them on St. Peter's river, Minn., about 1766. They consisted of two tribes, the Ishtasunda or Gray Eyes and the Hongashano. They lived an agricultural life. About 1800 they made a permanent peace with the Poncas and Pawnees. 1802 they were reduced by small-pox to 300 people, having previously been a prosperous tribe with 700 warriors: disheartened by their loss, they burned their villages and entered on a wandering life, going westward as far as the Niobrara river, Neb. Their enemies, the Sioux, pursued them relentlessly then as now. In 1815, 20, 25, and 30, by a succession of treaties, they ceded lands at Council Bluffs and elsewhere, receiving by the last treaty an annuity, a blacksmith, and agricultural implements. Missions have been established among them. 1854, Mar. 16, more lands were ceded. Since their great chief, Logan Fontanelle, was killed by the Sioux, 1855, they have given their attention entirely to agriculture, and have rapidly improved their condition. In 1873 they had a good church and three schools. In 1899 they numbered together with the Winnebagoes 2,375, at the Omaha and Winnebago Agency, Neb., between the Missouri and Elkhorn rivers.

OMAN, *ō-mân':* most eastern portion of Arabia, a strip of maritime territory between Ras-el-Jiboul and Ras-el-Had; bounded n.e. by the Gulf of Oman, and s.w. by the deserts of the interior; about 370 m. long, greatest breadth 120 m. A chain of mountains running parallel to the coast, 20 to 40 m. distant, reaches in its highest ridge, *Gebel Achdar* ('Great Mountain'), an elevation of 6,000 ft.; the average height is 4,000 ft. There are a few streams and some richly fertile tracts in this region, but the greater part is a waste of sand, with here and there a small oasis, where, however, the vegetation is most luxuriant. Groves of almond, fig, and walnut trees tower to an enormous height, overshadowing the orange and citron trees, but overtopped by the splendid date palms. The most powerful state of O. is *Muscat* (q.v.).

OMAR, *ō'mėr*, ABU-HAFSA-IBN-AL-KHETTAB: second caliph of the Moslems: 581–644 (reigned 635–644). His early history is little known, but previous to his conversion he was an ardent persecutor of Mohammed and his followers. After his conversion he became as zealous an apostle as he had formerly been a persecutor, and rendered valuable aid to the prophet in all his warlike expeditions. After Mohammed's death, he caused Abubekr (q.v.) to be proclaimed caliph, and was himself appointed *haujeb*, or prime-minister. He was a sagacious adviser, and it was at his suggestion that the caliph put down with an iron hand the many dissensions which had arisen among the Arabs after the prophet's decease, and resolved to strengthen and consolidate their newborn national spirit, as well as propagate the doctrines of Islam, by engaging them in continual aggressive

wars. On the death of Abu-bekr, O. succeeded as caliph, and pushed on the wars of conquest with increased vigor. He was summoned to Jerusalem 637, to receive the keys of that city, and before leaving gave orders to build a mosque, now called by his name, on the site of the temple of Solomon. O. then took command of a portion of the army, and reduced the other chief cities of Palestine. He then planned an invasion of Persia, which was commenced the same year, and by 642 the whole of what is now known as Persia was subdued. In the mean time the war in Syria was vigorously prosecuted, and the Byzantine armies, repeatedly defeated, at length gave up the contest. In 639, Amrû, one of his generals, had invaded Egypt with a considerable force ; but such was the prestige of the Arabs, or the incapacity of the lieutenants of Emperor Heraclius, that this valuable country, with its six millions of people, was reduced under the caliph's authority without a single contest, and at only two towns, Misr and Alexandria, was there even an attempt at defense. (For the story which was till lately believed concerning the destruction of the Alexandrian Library, see ALEXANDRIAN LIBRARY.) Barca and Tripoli were next subdued by Amrû. On the n., Armenia was overrun 641, and the caliph's authority reached from the Desert of Khiva to the Syrtis, an enormous extension in ten years. In 644, O. was assassinated in the mosque of Medina by a Persian slave for revenge. He languished five days after receiving the wound, but refused to appoint a successor, and named six commissioners who were to choose one from themselves. He was buried in the mosque of Medina, near the prophet and Abu-bekr, and his tomb is still visited by pilgrims.

O. may be called the founder of the Mohammedan power, as from a mere sect he raised it to the rank of a conquering nation, and left to his sucessor an empire which Alexander the Great might have envied. In him we find a rare combination of qualities, the ardent zeal of the apostle side by side with the cautious foresight and calm resolution of the monarch. His great military talents and severity to 'obstinate unbelievers' rendered him formidable to his enemies, and his inexorable justice rendered him no less obnoxious to the more powerful of his subjects, and gave rise to many attempts at his assassination. O. was the founder of many excellent institutions; he assigned a regular pay to his soldiers, established a night-police in towns, and made excellent regulations for more lenient treatment of slaves. He also originated the practice of dating from the era of the *Hedjrah* (see HEGIRA). He assumed the title *Emir-al-mumenin* ('Commander of the Faithful') in preference to that of *Khalifah-rasouli-Ilahi*, the ordinary designation; and to the present day his name is held in the greatest veneration by the orthodox or Sunî sect of Moslems.

OMAR PASHA.

OMAR PASHA, *ō'mĕr pä'shȧ* (real name MIKAIL LATTUS): Turkish general: 1806 (or 11)–1871; b. Plaski, an Austrian village in the Croatian Military Frontier. His father was an officer in the Austrian army, and Mikail was educated at the milit. school of Thurn, near Carlstadt, where he greatly distinguished himself. He afterward joined one of the frontier regts. as a cadet, and was employed as sec. by the milit. inspector of roads and bridges; but having by some breach of discipline rendered himself amenable to punishment, he fled to Bosnia, where he became bookkeeper to a Turkish merchant and embraced Mohammedanism. He was next employed by Hussein Pasha, gov. of Widin, as tutor to his sons; and 1834 was sent in charge of them to Constantinople, where his beautiful caligraphy gained him the post of writing-master in the milit. school. Omar Effendi (as he was then called) was next appointed writing-master to Abdul-Medjid, heir to the throne, and received the honorary rank of capt. in the Turkish army, and the hand of a rich heiress. On his pupil's accession 1839, O. was raised to the rank of col. and sent to Syria to aid in the suppression of disturbances in that province, and in 1842 was appointed milit. gov. of the Lebanon district. The severity of his rule did not hinder the Maronites from desiring to have him as chief of the Mountain; but in the following year he was recalled, received the title pasha, and was sent, with Redschid Pasha, against the revolted Albanians. The skill and energy with which he suppressed this insurrection, as well as others in Bosnia and Kurdistan, raised him high in favor with the sultan. Toward the end of 1852 he opened the campaign against the Montenegrins, who were being rapidly subdued, when Austria interfered and compelled a treaty. On the invasion of the Principalities by the Russians 1853, July, O. collected at Schumla an army of 60,000 men to cover Constantinople; but being no less a politician than a soldier, he soon divined that the Russians would not immediately cross the Danube, and accordingly pushed on to Widin, where he crossed the river in presence of the enemy and intrenched himself at Kalafat. Another part of the Turkish army moved down the Danube to Turtukai, near Silistria, crossed the river at that place, and intrenched themselves at Oltenitza. Nov 4, the latter division were attacked by 9,000 Russians, whom they totally defeated with a loss of nearly 4,000 men and almost all their officers. The Russians received two severe checks also at Kalafat 1855, Jan. 6 and Mar. 15. O. kept up the spirit of his troops by occasional successful skirmishes with the Russians, and threw a garrison of 8,000 men into Silistria. In the following spring the Russians passed the Danube at two points, and laid siege to Silistria (q.v.), but their assaults were invariably repulsed with severe loss. The Russians then withdrew from the Principalities, and O. entered Bucharest in triumph 1854, Aug. 1855, Feb. 9, he embarked for Eupatoria, where, on the 17th, he was suddenly attacked by 40,000 Russians, who were repulsed with great loss.

He was soon afterward (1855, Oct. 3) sent to relieve Kars, but arrived too late, and the armistice which followed (1856, Feb. 29) put a stop to his military career. He was subsequently made gov. of Bagdad; but having been accused of maladministration, was banished to Kaarport 1859. He was recalled in the following year, and 1861, Sep. was sent to pacify Bosnia and Herzegovina, which were again in insurrection. This being accomplished, he attacked the Montenegrins, captured their chief town of Cetinji, and overran the country 1862. O. held the grand cross of the Legion of Honor, and was a knight of the Russian Order of St. Anne. He ceased to take part in public life in 1869, being thereafter regarded as a minister without portfolio.

OMASUM, n. *ō-mā'sŭm* [L. *omāsum*, bullock's tripe]: in *anat.*, the third stomach, or manyplies, of ruminant animals.

OMBAY, *ōm-bī'*, or MALOEWA (Maluwa): island between Celebes and the n.w. coast of Australia; n. of Timor, from which it is separated by the Strait of Ombay; lat. 8° 8′–8° 28′ s., long. 124° 17′–125° 7′ e.; 961 sq. m. The hills of O. are volcanic, and the coasts steep and difficult to approach. The inhabitants are dark brown, have thick lips, flat nose, and woolly hair; appearing of mixed Negro and Malay origin. They are armed with the bow, spear, and creese, and live on the produce of the chase, with fish, cocoa-nuts, rice, and honey. A portion of the island belonged formerly to the Portuguese, but since 1851, Aug. 6, it has been entirely a Netherlands possession. The Dutch postholder resides at the village of Alor, to which iron wares, cotton goods, etc., are brought from Timor, and exchanged for wax, edible nests, provisions, and other native products. O. has oxen, swine, goats, etc., and produces maize, cotton, and pepper. Amber also is found, and the Boeginese of Celebes import European and Indian fabrics, exchanging them for the produce of the island, which they carry to Singapore. Pop. about 193,800.

OMBRE, n. *ōm'bĕr* [F. and It. *ombre*, a game at cards—from L. *homo*, a man: Sp. *hombre*, a man]: a game at cards, usually played by three persons.

OMBROMETER, n. *ŏm-brŏm'ĕ-tĕr* [Gr. *ombros*, rain; *metron*, a measure]: a rain-gauge.

O'MEARA, *o-mā'ra*, BARRY EDWARD: 1786–1836; b. Ireland: remembered from his connection with Napoleon I., whom he accompanied to St. Helena as household physician. At the age of 18 he entered the British army as asst.-surgeon. In 1808, stationed at Messina, he became concerned in a duel as second, and was dismissed from the service by sentence of court-martial. He succeeded in procuring an appointment as surgeon in the navy, and after some years of efficient service, he was serving with Capt. Maitland in the *Bellerophon* when Emperor Napoleon (q.v.) surrendered himself to that officer. Napoleon proposed that O'M. should accompany him into exile as private physician; and O'M. acceded, stipulating that he

should retain his rank in the navy, and be permitted to return to it at pleasure. In daily intercourse with the fallen emperor at St. Helena for about three years, O'M. seems to have been admitted to some intimacy. O'M. took notes of his conversations with Napoleon, which he afterward published. Meantime he became involved in the interest of Napoleon, in the series of miserable and petty squabbles which he waged with the gov., Sir Hudson Lowe (q.v.). The result of these, as regards O'M., was that 1818, after a violent altercation with Sir Hudson, he was committed to close arrest, and was authorized by the emperor to resign his post. On his return to England, he addressed a letter to the admiralty, in which, among other things, he accused Sir Hudson Lowe of intentions against the life of his captive, and even of having, by dark hints to himself, insinuated a desire for his services as secret assassin. For this he was instantly dismissed the service. The accusation was plainly monstrous and incredible. In 1822, after Napoleon's death, O'M. published *Napoleon in Exile*. As conveying to the world the first authentic details of the prison-life of the great soldier, it caused immense sensation, and—though for obvious reasons to be accepted only with great caution—it has still some value, and considerable interest. The last years of O'M.'s life were passed in obscurity in the neighborhood of London, where he died.

OMEGA, n. *ō-mē'gă* [Gr. the *ō* long]: the last letter of the Greek alphabet; the last; the end; in Gr. the short *ŏ* is called *omīcrŏn*.

OMELET, or Omelette, n. *ŏm'ĕ-lĕt* or *ŏm'lĕt* [F. *omelette* —from OF. *alemelle*, a thin plate—from L. *lamĭna*, a thin plate]: a kind of pancake, chiefly of eggs. These are broken; and their contents in a proper vessel are whipped into a froth, which is then poured into a very clean and dry frying-pan, with the addition of lard or butter to prevent sticking, and then fried carefully, so that the outside is nicely browned. Before frying, one of a number of ingredients may be added to vary the omelette, such as chopped savory herbs, minced ham or bacon, salt-fish, shell-fish, game, etc. Or sweet omelettes may be made by placing preserved fruits upon them when quite or nearly cooked. The O., though simple, requires skill for successful preparation.

OMEN, n. *ō'mĕn* [L. *omen*, a token of good or bad luck —*ominis*, of an omen]: a sign foreboding good or evil; a prognostic or presage. The interpretation of omens was extremely arbitrary. It was supposed that evil indicated as approaching might be averted by various means, as by sacrifices, or by utterance of certain magic formulas; or by an extempore felicity of interpretation, as when Cæsar, having fallen to the ground on landing in Africa, exclaimed: 'I take possession of thee, Africa.' Occasionally, there was reckless disregard of omens; e.g., when P. Claudius, in the First Punic War, caused the sacred chickens, who would not leave their cage, to be pitched into the sea, saying: 'If they will not eat, they shall drink.' Still the belief in omens was universal, and in general the greatest care was taken to avoid unfavorable omens. The heads of the sacrificial priests were covered, so that nothing distracting might catch their eyes; silence was enjoined at the commencement of every sacred undertaking, and at the opening of the *Ludi*. Before every sacrificial procession ran the heralds, calling on the people to 'pay respect to it,' and admonishing them to cease working till it should have passed, that the priests might not hear sounds of ill omen. At the beginning of a sacrifice, the aid of music was sought to drown whatever noises might prove unpropitious. Compare Auguries and Auspices: Divination. See also Fallati, *Ueber Begriff und Wesen des Rom. Omen* (Tüb. 1836.)—The belief in omens has existed in all ages and countries, and traces of it linger even yet in the most civilized communities; e.g., the dread at sitting down to table in a party of *thirteen*. Not a little of the philosophy of omens is contained in the Scottish proverb: 'Them who follow freits, freits follow;' meaning, that a fatalistic belief in impending evil paralyzes the endeavor that might prevent it. Omened, a. *ō'mĕnd*, containing a sign or token for good or evil. Ominous, a. *ŏm'ĭ-nŭs*, foreboding evil; inauspicious. Om'inously, ad. *-lĭ*. Om'inousness, n. *-nĕs*, the quality of being ominous.—Syn. of 'omen': prognostication; portent; indication; augury.

OMENTUM, n. *ō-mĕn'tŭm* [L. *omentum;* It. *omento*]· a membranaceous covering of the bowels placed immediately above the intestines, and inclosing more or less fat; the caul. Omental, a. *ō-mĕn'tăl*, belonging to the omentum. See Peritoneum.

OMER, n. *ō'mĕr* [Heb.—see Homer]: a Heb. measure, being about 3·468 imperial quarts.

OMINOUS: see under Omen.

OMISSION, n. *ō-mĭsh'ŭn* [F. *omission*—from L. *omissĭōnem*—from *omissus*, passed over, neglected—from *ob*, down, away from; *mittĕrĕ*, to let go, to send: It. *omissione*]: neglect or failure to do; neglect of that which duty required to be done; failure to insert or mention. Omissible, a. *ō-mĭs'sĭ-bl*, capable of being omitted. Omis'sive, a. *-sĭv*, leaving out.

OMIT, v. *ō-mĭt'* [L. *omittĕrĕ*, to pass over, to neglect—from *ob*, away from; *mittĕrĕ*, to let go, to dismiss: It. *omettere:* F. *omettre*]: to leave out; to neglect or pass by; to fail to insert or mention. Omit'ting, imp. Omit'ted, pp.

OMMIADES, *om-mē'adz*, or OMAIADES, or OMMEYADES, or OMAYYADS: dynasty (named from an ancestor, Ommeyah) which succeeded to the Arabian caliphate on the death of Ali, fourth caliph after Mohammed, and possessed it till superseded by the Abbasides (q.v.) 750.—MOAWIYAH, founder of the dynasty, was son of Abu-Sofian, who defeated Mohammed at Beder, and his mother was the notorious Hinda. After the death of Othman, the third caliph, Moawiyah his cousin claimed the throne, and during the whole of Ali's reign ruled over the w. provinces of Syria and Egypt; but it was not till the death of that caliph, and the abdication of his son Hassan 661, that Moawiyah's authority was fully recognized. In that year he transferred the seat of the caliphate to Damascus: Kufa having been the residence of Ali, and Medina of the first three caliphs. The Arabs continued to extend their conquests during his reign; the Turks in Khorassan were subdued, Turkestan invaded, and several important acquisitions made in Asia Minor. But besides aggrandizing his empire, the caliph neglected no means of consolidating it, and partly for this reason he made the succession hereditary, and caused his son YEZID (680–683) to be recognized as his heir.—The reigns of Yezid and his successors, MOAWIYAH II. (683) and MERWÂN I., previously the traitorous sec. of the caliph Othman (683–685), are devoid of importance, as their sway extended only over Syria and Palestine.—ABDULMELEK (685–705), an able and warlike prince, after a long and varying struggle of eight years, made himself undisputed ruler of the Mohammedan world (692), but the latter part of his reign was much disturbed by rebellions in the e. provinces. He was the first caliph who interested himself in the promotion of liberal knowledge, by causing the most celebrated poetical and other works of the Persians to be translated into Arabic; and under his reign coined money was first introduced. It was to this prince that his court-fool related the celebrated fabulous conversation between the owl of Bassora and that of Mosul.—Four of his sons, WALID I. (705–716), SULIMAN (716–717), YEZID II. (720–723), and HESHÂM (723–742), successively occupied the throne, and a fifth son, Mosslemah, was, from his great military abilities and zealous devotion to the interests of his brothers, the terror of all their enemies, both domestic and foreign. Under Walid, the Ommiade caliphate reached the summit of its power and grandeur; n. Africa (709) and Spain (712), Turkestan (707), and Galatia (710) were conquered; and toward the close of his reign his empire extended even to the Indus. The slender structure of the minaret was then introduced into mosque architecture.—OMAR II. (717–720), who, in the justice and mildness of his government, surpassed all others of the race of Ommeyah, was appointed to succeed Suliman; but having excited discontent among his relatives by suppressing the formula of malediction, hitherto regularly pronounced at all public ceremonies against Ali and his descendants, he was poisoned. During his reign, Mosslemah had completed the conquest of Asia Minor, and even compelled Emperor Leo to submit

to the humiliation of walking beside his horse through the principal streets of Constantinople itself, and paying a large ransom (equivalent to about $700,000) for his capital.—Heshâm, though, like his immediate predecessor, fond of pleasure, possessed all the qualities necessary for a sovereign. The Greeks, who still strove for possession of Asia Minor, were repeatedly defeated: the fierce Turks of n. Persia and Turkestan were kept in stern subjection; and the civil affairs of the empire carefully and strictly administered. The death of Mosslemah, champion of the Ommiade dynasty, seems to have been the signal for insurrection; the descendants of Ali raised the standard of revolt, and no sooner were they subdued than Ibrahim, fourth in direct descent from Abbas the uncle of Mohammed, solemnly invested the celebrated Abu-Mosslem (stated to be a descendant of Koderz, one of the most distinguished heroes of Firdusi's admired work the *Shah-nameh*) with the arduous duty of enforcing his long-agitated claims to the throne. During this reign the progress of Arab conquest in w. Europe was checked by Charles Martel, who inflicted on the Arabs a severe defeat at Tours (732), and almost annihilated their army at Narbonne (736).—The reigns of Walid II. (742–743), Yezid III. (743–744), and Ibrahim (744), though of ephemeral duration, were long enough to produce a complete disorganization of the empire; and though Merwân II. (744–750), next and last caliph of the house of Ommeyah, was both an able and politic ruler and a skilful warrior, the declining fortune of his family was beyond remedy. Abu-Mosslem, who had published the claims of the Abbasides amid the ruins of Meru 747, took the field at the head of a small but zealous band, and carried the black flag of the Abbasides from victory to victory, till before the close of the following year the whole of Khorassan acknowledged his authority. Irak was subdued 749; and though Ibrahim the Abbaside claimant was seized by Merwân and put to death the same year, his brother Abul-Abbas succeeded to his claims, and the unfortunate caliph, defeated in two engagements, fled to Egypt (750), whither he was pursued and where he was slain. Abdallah, uncle of the successful claimant, treacherously invited the remaining members of the house of Ommeyah to a conference, and ordered a general massacre of them. Two only escaped: one to s.e. Arabia, where he was recognized as caliph, and his descendants reigned till the 16th c.; the other, Abderrahman, to Spain, where he founded the caliphate of Cordova.

Ommiades of Spain.—Abderrahman I. (755–787), accepting the Spanish throne offered him by the Arab chiefs, assumed the titles *Caliph* and *Emir-al-mumenin*, and, in spite of numerous revolts, strengthened and extended his power in Spain, till, with the exception of Asturias and the country n. of the Ebro, his authority was everywhere acknowledged. His defeat of Charlemagne at Roncesvalles (q.v.) was notable. He divided his kingdom into six provinces, whose rulers, with the *walis* of the 12 principal towns, formed a sort of national diet.—His successors,

Hesham I. (787–796) and Al-Hakem I. (796–821), were much troubled with internal revolts, under cover of which the Christians in the n.e. established the state known as the 'Spanish March.'—Abderrahman II. (821–852) re-established internal quiet, and occupied his subjects with incessant wars against the Christians, in which was developed among the Arabs a chivalrous heroism found nowhere else in the Mohammedan world. Abderrahman, a man of learning, greatly encouraged the arts and sciences, and diffused information among his people; he also attempted, by regulating the laws of succession to property, to constitute his kingdom on a basis analogous to that of other European nations. During his reign Mohammedan Spain was the best governed country in Europe.—His successors, Mohammed I. (852–880), Mondhar (880–882), and Abdallah (882–912), followed in his footsteps.—Abderrahman III. (912–961), after suppressing some dangerous revolts which had gathered head during his minority, conquered the kingdom of Fez from the Edrisites, and brought a long and exhausting war with the powers of Asturias and Leon to a victorious conclusion. This period is justly termed the golden age of the Arab domination in Spain; at no other time was their power so consolidated, and their prosperity so flourishing. Abderrahman, like his predecessors, was a great encourager of learning, and a poet of some ability. He founded schools which far surpassed those in other parts of Europe.—His son, Al-Hakem II. (961–976), was in every way worthy to be be his successor, but his premature death was the cause of the downfall of the Ommiades in Spain.—Hesham II. (976—about 1013), a child of eight years, succeeded to the throne; but fortunately his mother, Sobeiha, had abilities necessary for such an emergency, and appointed as her son's vizier Mohammed ben Abdallah, surnamed Al-Mansor, originally a peasant. This remarkable man gained the affections of all ranks by his pleasing manners and great abilities; his administration was equally just and judicious, and his encouragement of literature, science, and art alike liberal and discriminating. But it is as warrior chiefly that he is remembered; he had vowed eternal enmity to the Christians, and in all his numerous expeditions fortune seemed chained to his standard. The lost provinces were recovered; Castile, Leon, and Barcelona were conquered; and Navarre was on the point of sharing the same fate, when a rebellion in Fez compelled him to detach a portion of his force for service in Africa, and the combined armies of the four Christian monarchies, seizing this opportunity, inflicted on the Arabs a sanguinary defeat, 1001. Mohammed's spirit was completely broken by this blow, and he died a few days afterward. With him the star of the house of Ommeyah set forever. The rest of Hesham's reign was a scene of disorder and civil war. Pretenders to the caliphate arose, while the 'walis' of the various provinces set up as independent rulers, and the invasions of the Christians added to the confusion. Hesham finally resigned the throne about 1013; and, except the brief reign

of Hesham III. (1027–31), from this time the family of Ommeyah, which had for more than two centuries so happily and brilliantly governed the greater part of Spain, disappears from history. One remarkable feature of their rule deserves mention—their universal toleration in religion—contrasting favorably with the contemporary and subsequent rulers of Spain, even to the present time.

OMNI-, *ŏm'nĭ-* [L. *omnis,* all]: a prefix meaning 'all; wholly.'

OMNIBUS, n. *ŏm'nĭ-bŭs* [L. *omnĭbus,* for all—from *omnis,* all]: a large public carriage for conveying passengers short distances, generally in cities and towns. Vehicles of this sort were started first in Paris 1662, by a royal edict of Louis XIV., for the infirm, or those unable to afford a hired carriage. The omnibuses were for some time monopolized by the wealthier classes, and when the novelty had ceased, they gradually disappeared. They re-appeared in Paris 1827, carrying 15 to 18 passengers inside; and 1829 they were introduced into London by a Mr. Shillibeer, whose conveyances, long known as *shillibeers* (an epithet said to have been in common use also in New York), were larger than the French, carrying 22 passengers inside, and drawn by three horses abreast. The omnibus was introduced into Amsterdam 1839, and its use has since been extended to all large cities and towns in the civilized world. The seats are usually placed lengthwise, and the door behind; and the vehicle is managed by a driver and a conductor. In New York, omnibuses, which formerly thronged the principal streets, have given place to street-cars which are really omnibuses drawn on railways. The same change is taking place in other Amer. cities, and is rapidly extending in Great Britain, where the vehicles are called tramway-cars.

OM'NIBUS BILL (Henry Clay's Compromise 1850): see Compromise Measures.

OMNIFARIOUS, n. *ŏm'nĭ-fā'rĭ-ŭs* [L. *omnĭfā'rĭus,* of all sorts—from *omnis,* all; *vărĭus,* different]: of all varieties, forms, or kinds.

OMNIFEROUS, a. *ŏm-nĭf'ĕr-ŭs* [L. *omnis,* all; *fero,* I produce]: bearing or producing all kinds.

OMNIFIC, a. *ŏm-nĭf'ĭk* [L. *omnis,* all; *fĭo,* I am made] all-creating.

OMNIFORM, a. *ŏm'nĭ-fawrm* [L. *omnis,* all; *forma,* shape]: of every form or shape. Om'nifor'mity, n. *-fŏr'-mĭ-tĭ,* quality of having every form.

OMNIPARITY, n. *ŏm'nĭ-păr'ĭ-tĭ* [L. *omnis,* all; *par,* equal]: general equality.

OMNIPERCIPIENT, a. *ŏm'nĭ-pĕr-sĭp'ĭ-ĕnt* [L. *omnis,* all; *percipiens* or *percĭpien'tem,* perceiving or understanding]: perceiving all things. Om'nipercip'ience, n. *-ĭ-ĕns,* perception of everything.

OMNIPOTENT, a. *ŏm-nĭp'ŏ-tĕnt* [L. *omnis*, all; *potens* or *poten'tem*, powerful]: all-powerful; almighty; having unlimited power: N. one of the titles of God. OMNIPOTENTLY, ad. *-lĭ*. OMNIP'OTENCE, n. *-tĕns*, unlimited or infinite power—applicable only to God; an attribute of God; also OMNIP'OTENCY, n. *-tĕn-sĭ*.

OMNIPRESENT, a. *ŏm'nĭ-prĕz'ĕnt* [L. *omnis*, all; *præsens* or *præsen'tem*, present]: present everywhere at the same time. OM'NIPRES'ENCE, n. *-prĕz'ĕns*, unbounded or universal presence; ubiquity.

OMNISCIENT, a. *ŏm-nĭsh'ĕnt* [L. *omnis*, all; *scientĭă*, knowledge; *sciens*, knowing]: all-knowing; infinitely wise. OMNIS'CIENTLY, ad. *-lĭ*. OMNIS'CIENCE, n. *-ĕns* [F.—L.], or OMNIS'CIENCY, n. *-ĕn-sĭ*, universal knowledge; knowledge unbounded or infinite.

OMNIUM, n. *ŏm'ni-ŭm* [L. *omnĭŭm*, of all—from *omnis*, all]: term at the stock exchange expressing the aggregate value of the different stocks in which a loan is funded. See M'Culloch's *Dictionary of Commerce*. OMNIUM GATHERUM, *ŏm'nĭ-ŭm găth'ĕr-ŭm* [L. *omnĭŭm*, of all, and slang L. *gathĕrum*, that which is collected]: a familiar phrase, denoting a miscellaneous collection of things or persons.

OMNIVOROUS, a. *ŏm-nĭv'ŏ-rŭs* [L. *omnĭvŏrus*, all-devouring—from *omnis*, all; *voro*, I devour or eat up]: feeding on both animal and vegetable substances.

OMOHYOID, a. *ō'mō-hī'oyd* [Gr. *ōmos*, the shoulder, and Eng. *hyoid*]: a name given to a muscle attached to the hyoid bone and the shoulder-blade.

OMPHACINE, a. *ŏm'fă sĭn* [Gr. *omphax* or *omphăka*, an unripe grape]: obtained or expressed from unripe fruit: N. the mixed oily matter pressed from green olives.

OMPHALIC, a. *ŏm-făl'ĭk* [Gr. *omphălos*, the navel or navel-string]: pertaining to the navel. OMPHALOCELE, n. *ŏm'făl-ŏ-sēl'* [Gr. *kēlē*, a swelling or tumor]: rupture or hernia of the navel. OMPHALOTOMY, n. *ŏm'făl-ŏt'ŏ-mĭ* [Gr. *tomē*, a cutting]: the operation of cutting the umbilical cord or navel-string.

OMPHALISM, n. *ŏm'făl-ĭzm* [Gr. *omphălos*, the navel]: government from the centre.

OMPHALODIUM, n. *ŏm'făl-ō'dĭ-ŭm*, or OM'PHALODE, n. *-lōd* [Gr. *omphălos*, the navel or navel-string; *hodos*, a way; or perhaps *eidos*, resemblance]: in *bot.*, the central part of the hilum of a seed through which nourishing vessels pass. OMPHALOID, a. *om'făl-oyd* [Gr. *eidos*, resemblance]: resembling the navel.

OMSK, *ŏmsk:* town of the Russian province of Central Asia, govt. of Akmollinsk; at the confluence of the Om—a river more than 200 m. in length—with the Irtish; 2,225 m. from St Petersburg; lat. 54° 59′ n., long. 73° 30′ e. It was built 1716, as a defense against the Khirghiz; but is now of no importance as a fortress. It was till a recent date the centre of govt. for w. Siberia, centre of the administration of the Siberian Khirghiz, seat of the courts of justice, and of the Siberian corps of cadets. It contains

manufacturies and mining works. Hitherto its commerce has been limited to a trade with the Khirghiz, who drive up their cattle to this place; but its advantageous position on the great post-road and commercial line of traffic from Europe across Siberia to the Chinese frontier, gives it some prospect of becoming an intermediate station for extensive commercial exchanges. Pop. about 38,000.

OMUL (*Salmo migratorius*): fish of the salmon and trout tribe, abounding in Lake Baikal and other waters of e. Siberia, from which great quantities are sent salted to all the w. parts of that country. In size it is rarely more than 15 or 16 inches long. Its flesh is very white and tender. It ascends rivers in shoals for the purpose of spawning.

ON, prep. *ŏn* [Ger. *an;* Goth. *ana;* Dut. *aan*, to, upon: Gr. *ana*, up, on, upon]: above, and in contact with the upper surface of a thing; not off; upon; at or near; denoting dependence or reliance; denoting nearness or closeness; denoting addition or accumulation: AD. forward in progression; in continuance; without ceasing; opposed to *off*. ON A SUDDEN, suddenly. ON-GOING, procedure; event: ADJ. progressing; without intermission. ON-HANGER, one who attends on or follows closely, as an idler; a lounger—more usually *hanger-on*. ON-LOOKER, one standing looking on. ON THE WAY or ON THE ROAD, travelling; journeying; making progress. ON THE ALERT, in a state of vigilance. ON HIGH, above; in the heavens. ON FIRE, in a state of burning; in a rage or passion. ON THE WING, in flight; departing. TO PUT ON, to attach to the body as, clothes or arms.

ON, int. *ŏn:* a word of excitement or encouragement to attack or advance; a contraction for *go on*.

ON, pron. *ŏng* [F.]: one; they. ON DIT, *ŏng dē* [F. they say, it is said]: a flying rumor or report.

ONAGER, n. *ŏn'a-jĕr* [L.]: the wild ass: see ASS.

ONAGER, *ŏn'a-jĕr:* ancient military engine: see BALLISTA.

ONAGRACEÆ, *ŏn-a-grā'sē-ē*, or ONAGRARIÆ, *ŏn-a-grā'-rĭ-ē*, or ŒNOTHERACEÆ, *ē-nŏth-ĕr-ā'sē-ē:* natural order of exogenous plants, chiefly herbaceous, but including a few shrubs; with simple leaves; axillary or terminal flowers; stamens generally four or eight, rarely one or two, inserted with the petals; the ovary generally 4-celled, sometimes 2-celled; the style threadlike, the fruit a capsule or a berry. There are several genera, and about 450 known species, natives chiefly of temperate climates, among which are some much cultivated for the beauty of their flowers, particularly those of the genera *Fuchsia*, *Œnothera* (Evening Primrose), *Clarkia*, and *Godetia*. (For Evening Primrose, see ŒNOTHERA.) The species are very numerous in America. A few species produce edible berries, and the roots of one or two are eatable; but none are of economical importance. The root of *Isnarda alternifolia*, found in the marshes of Carolina, and called *Bowman's Root*, is emetic. Some species of *Jussiæa* are used in dyeing in Brazil.

ONANISM, n. *ō'nă-nĭzm* [from *Onan*, of Scripture]: the sin of Onan; self-pollution; masturbation.

ONCE, ad. *wŭns* [a corruption of *ones*, the plu. of *one*, which see]: one time; one time but not more; a single time; all at one time; formerly: N. one time; the same time, as this once, that once. AT ONCE, at the same point of time; immediately. ONCE AND AGAIN, at repeated times; repeatedly.

ONCE, n. *ŏns* [F. *once;* Sp. *onza;* It. *lonza*]: a species of wild cat: see OUNCE 2.

ONCKEN, *ŏnk'ĕn*, JOHANN GERHARD: German Bapt. missionary: b. Varel, Oldenburg, 1800. After service as a domestic, and a visit to England, he sold books at Hamburg, joined an Eng. Congl. chh., and became agent of the Lower Saxony Tract Soc. and the Edinburgh Bible Soc. In 1834 he organized and became pastor of a Bapt. chh. The next year he travelled widely in Germany and Denmark as missionary of the Amer. Bapt. Convention. He was imprisoned in Hamburg for preaching and baptizing, but the good work of his church in relieving suffering consequent on a conflagration, 1842, led the govt. to commend and protect him and his flock. In 1852 he came to the United States, and collected money to build chapels. He edited a religious journal in English and one in German, was untiring in publishing tracts and editions of the Scriptures, and his work of distributing these and preaching extended to other parts of the German Empire and to Switzerland, some of the results reaching to s. Russia. After 30 years of labor the German Bapt. missions numbered 76 churches and over 11,000 members. He d. 1884, Jan. 2.

ONCOCAR'PUS: genus of trees of natural order *Anacardiaceæ*. One of the most remarkable trees of the Fiji Islands is *O. atra*, or *O. vitiensis*, a tree about 60 ft. high, with large oblong leaves and a corky fruit, somewhat resembling the seed of a walnut; the sap of which, if it comes into contact with the skin, produces a pain like that caused by red-hot iron The wood is often called Itch-wood, because of the effect produced on persons who ignorantly or incautiously strip off its bark while the sap is fresh, even the exhalations causing intolerable itching and innumerable pustules, with excessive irritation for several days: the effects continue to be unpleasantly felt for months.

ONCOTOMY, n. *ŏng-kŏt'o-mĭ* [Gr. *ongkos*, a tumor; *tomē*, a cutting]: in *surg.*, the opening of a tumor with a lancet or other cutting instrument.

ONDE, a. *ŏn'dĕ*, or ONDY, a. *ŏn'dĭ* [F.]: in *her.*, wavy; applied to charges, the edges of which are curved and recurved like waves.

ONDERDONK, *ŏn'dĕr-dŏnk,* HENRY USTICK, DD., LL.D.: 1789, Mar. 16—1858, Dec. 6; b. New York. He graduated from Columbia College 1805, studied medicine in Edinburgh, and practiced in New York; studied theology, was ordained priest in the Prot. Episc. Chh. 1816, and engaged in missionary work in Canandaigua, N. Y.; was rector of St. Ann's Church, Brooklyn, 1820–27, asst. bp. of Penn. 1827–36, and bp. of Penn. 1836, till his suspension on charges 1844. He was reinstated 1856. Among his books were *Episcopacy Examined and Re-examined, Essay on Regeneration,* and *Sermons and Charges.* He wrote several hymns, one of which, *The Spirit in Our Hearts,* is in use by nearly all evangelical denominations. He died in Philadelphia.—His brother, BENJAMIN TREADWELL O., DD., LL.D.: 1791, July 15—1861, Apr. 30; b. New York. He graduated from Columbia College 1809, was asst. minister in Trinity Church, New York, prof. in the Gen. Theol. Seminary in New York 1821–45, bp. of N. Y. 1830–45, and was suspended on charges in the latter year. He died in New York.

ON DIT, *ŏng dē* [F. one says, they say]: they say, people say; it is said. As a noun it is used to signify a current rumor, a flying report.

ONE, a. *wŭn* [Goth. *ains;* Ger. *ein;* W. *un;* Gael. and Ir. *aon,* one: L. *unus;* OL. *oinos;* Gr. *henos,* of one]: a single number; opposed to *another* or *other;* some or any; different; individual: N. a single person; a single thing. ONES, plu. *wŭnz,* persons. ONENESS, n. *wŭn'nĕs,* singleness; unity. ALL ONE, just the same. AT ONE, in union; in concord. ONE DAY, on a certain or particular day now past. ONE OF THESE DAYS, at some indefinite time. ONE O'CLOCK, the hour of one on the clock. ONE-EYED, a. having only one eye. ONE-SIDED, a. partial; limited to one side. ONE-SIDEDNESS, n. state of being partial.

ONE, n. *wŭn* [F. *on,* one, people, they—from OF. *om* or *omme*—from L. *homo,* a man]: used in an indefinite sense, any man; any person, as *one's* own choice, *one* may speak; a unity. ONE'S SELF, or ONESELF, I and not another. ONE ANOTHER [*one* + *one-other*], as in the phrase, they love *one another,* that is, each of them loves *the other.* *Note.*—ONE has been put into two separate entries, but the distinctions between them are not always apparent. Skeat affirms that ONE 2 is a mere adaptation of ONE 1.

-ONE, suff. *-ōn:* in *chem.,* suffix used as an abbreviation of acetone or ketone, thus, benzone, benzoic ketone. This termination is sometimes employed without definite meaning, as in quinone.

ONEGA, *o-nā'gâ:* small town and seaport in n. Russia, govt. of Archangel, 90 m. s.w. of the city of Archangel; lat. 63° 54′ n., long. 38° 7′ e. It stands at the mouth of a river, on the shore of the Gulf of O.; the latter a part of the White Sea. The people are employed in connection with the saw-mills of the 'Onega Trading Wood Company;' and about 50 ships leave the port annually for England, with cargoes of deals and timber to the value of £37,000. Pop. 2,309

ONE'GA, Lake: lake in n. Russia, govt. of Olonetz: after Ladoga, the largest lake in Europe; about 150 m. long, and 50 m. in greatest breadth; 3,720 sq. m. It is fed by numerous rivers, and receives through the river Wodlo the waters of the lake of that name. Its only outlet is the river Swir, which flows s.w. into Lake Ladoga. By means of the Mariinsky system of communication, Lake O. communicates with the Volga, and thence with the Caspian Sea on the south, and with the Dwina, and thence with the White Sea on the north. The clear and beautiful waters of this lake are rich in fish, and embrace many islands. The depth ranges from 550 to 700 ft. A peninsula divides it into n. and s. portions: the s. portion has few islands, and a not very irregular shore; the n. portion is greatly indented with inlets, and has numerous islands and submerged islands, making navigation dangerous. This danger is avoided by means of the Onega canal, which extends from Vytegra on the Vytegra river to the river Swir.

ONEGLIA, *o-nāl'yâ:* town of n. Italy, province of Porto Maurizio, on the Gulf of Genoa, 40 m. e.n.e. from Nice, at the mouth of the Impero, a small river which rushes down from the Apennines. The harbor is not good. The principal article of export is oil. Andrea Doria, great Genoese admiral, was born here. Pop. about 8.000.

ONEIDA, *ō-nī'da:* village in Oneida tp., Madison co., N. Y.; on Oneida creek, and the New York Central and Hudson River, and the New York Ontario and Western railroads, 26 m. from Syracuse, 27 m. from Utica; in a fertile region, and a centre of the hop-growing industry. It has several churches, good schools and a seminary, one semi-weekly and three weekly papers, one savings bank, two private and two national banks, and an extensive trade with the surrounding region. There are also large manufacturing inter. Pop. (1910) 8,317.

ONEI'DA COMMU'NITY: see Perfectionists.

ONEI'DA LAKE: lake in the central part of N. Y.; within the limits of Madison, Oswego, Oneida, and Onondaga counties, about 12 m. n.e. of Syracuse. Its greatest width is 6 m., its length 20 m., and its elevation 369 ft. above sea-level. Oneida river, 18 m. in length, forms its outlet and leads to the Oswego river. The lake is well stocked with fish. Before the building of railroads the lake and river were largely used in the transportation of freight and passengers.

ONEIDAS, *o-nī'daz:* tribe of N. American Indians whose territory extended from Deep Spring, near Manlius, Onondaga co., N. Y., to a point below Utica. Their name signifies 'tribe of the granite rock,' and their totem was a stone in a forked stick. They were a secondary tribe, set apart from the Mohawks, and were comprised in the Six Nations. They were divided into three clans and had nine sachemships. They joined the Onondagas in making peace with Canada 1653, and were visited by missionaries, who labored among them till the close of the century.

Prior to that time they were very difficult to manage, being in constant conflict with the early French settlers of Canada and their allies, the Hurons and Montagnais. Their wars with the southern tribes had reduced them to about 150 warriors. They united in the general peace with the French 1700, Sep. 8, but were allies of the English in all subsequent wars. At the time of the revolution they were the only tribe in the great council of the Iroquois confederacy who espoused the cause of the colonists, and with the Tuscaroras, arrayed themselves against the English. As a result of this allegiance they were driven from their homes, their houses and church were burned, and their property destroyed. They received compensation from the United States by treaty 1794, Dec. They had previously ceded their lands to the state of N. Y., reserving a tract which was never to be sold or leased except in part. The Brotherton and Stockbridge Indians kept the lands which they had received from the O. The O. have practically disappeared as a reservation tribe, though they have special schools provided by the state. Those who are still among the communal Indians are on reservations other than those originally set apart for them. Some of the tribe emigrated to Canada and settled on the Thames, but the majority purchased a large tract on Green Bay, Wis., 1821, where they mingled with the white settlers and have become prosperous. Those who remained on their reservations near Utica were employed by their white neighbors, and now have their own farms and are advancing in prosperity. They have acquired a knowledge of agriculture and the mechanical arts, and have schools and churches. They now number about 3,000.

O'NEILL, *o-nēl'*, ELIZA (Lady BECHER): 1795-1872, Oct. 29; b. Ireland; daughter of John O'N., actor. She rose to the highest rank as a tragic actress. She married, 1819, W. Wrixton Becher, M.P., of co. Cork, who was made a baronet 1831.

ONEIROLOGY, *ŏn-ī-rŏl'-ō-jĭ* [Gr. *oneiros*, dream, and *logos*, doctrine]: the science of dreams and their interpretation. Except as a part of psychology, modern science recognizes no such branch of learning.

ONEIROMANCY, n. *ō-nī'rō-măn'sĭ* [Gr. *oneiros*, a dream; *manteï'a*, divination]: divination by dreams.

ONEONTA, *ō-nĕ-ŏn'ta:* village, Otsego co., N. Y.; on the Susquehanna river, and on the Albany and Susquehanna and the Cooperstown and Charlotte Valley railroads. It has machine-shops, grain-elevators, planing-mills, and piano, cigar, and shirt factories; a public library of 4,000 vols., 3 banks, and the state normal school.—Pop. (1900) 7,147.

ONEROUS, a. *ŏn'ĕr-ŭs* [L. *onerōsus*, burdensome—from *onus*, a burden: It. *oneroso;* F. *onéreux*]: heavy; burdensome; oppressive: in Scotch law, being of mutual advantage. ONEROUS CAUSE, in *Scotch law*, a pecuniary or valuable consideration. ON'EROUSLY, ad. *-lĭ.*

ONICOLO, n. *ō-nĭk'ŏ-lō*, or NICOLO, n. *nĭk'ŏ-lō* [Gr. *nikolāŏs*, a proper name]: a variety of onyx with a deep-brown ground, on which is a band of bluish white, used for making cameos.

ONION, n. *ŭn'yŭn* [F. *oignon*—from L. *unĭō*, a pearl, but found in Columella, signifying a kind of onion—from *unus*, one]: name given to a few species of the genus *Allium* (q.v.); particularly to *A. cepa* (Lat. *cepa*), a biennial bulbous-rooted plant, with swelling stem, leafy at the base, tapering fistular leaves, a reflexed spathe, a large globose umbel, usually not bulbiferous, the lobes of the perianth obtuse and hooded, not half as long as the stamens. The bulb is simple—not composed of cloves, like that of garlic; and in the common variety is solitary, showing little tendency to produce lateral bulbs. The native country of the O. is not known, some supposing it to be India and some Egypt, in both of which it has been cultivated from the most remote antiquity. The part chiefly used is the bulb, but the young leaves also are used, and young seedlings drawn from onion beds are used in soups and sauces: these are known in Scotland as *syboes* (evidently another form of the word *Cibol*). In warmer climates, the O. produces a larger bulb, and generally of more delicate flavor; and is used more as food, instead of as mere condiment. In Spain and Portugal, a raw O. is often eaten like an apple, and often with a piece of bread forms the dinner of a working-man. The O. is very nutritious. The oil, which is somewhat acrid, is dissipated and the O. made more digestible by boiling. The O. usually stimulates the organs of secretion and digestion, though with some stomachs it does not agree. It is an excellent expectorant, is valuable for poultices for some forms of sores, and is used as a remedy for various ailments of children. In medicinal qualities it is similar to Garlic (q.v.), but milder. The ordinary varieties of the O. succeed best n. of the 40th parallel of latitude, but from either seed or sets can be grown in all parts of the United States. Seed is principally used at the North and sets at the South. The crop can be grown on a variety of soils, but a rather sandy loam is to be preferred. The land should be rich, free from stones and from the seeds of weeds, and should be sown to carrots or some other carefully cultivated crop the year before it is sown to onions. It should be heavily manured in the fall, and plowed to a depth of about six inches. As soon as it can be worked in the spring, the surface must be thoroughly pulverized. The application of 100 bushels of hard wood ashes, 1,000 lbs. of superphosphate, or 1,000 to 2,000 lbs. of Peruvian guano and ground bone in equal proportions per acre, will greatly increase the crop. Heavy manuring and early sowing are indispensable. Rows should be from 14 to 18 inches apart, and perfectly straight to facilitate cultivation. A machine should be used for sowing, and a hand cultivator for working the soil between the rows. Four to six pounds of seed per acre is requisite—the smaller quantity being sufficient if the rows are wide apart, the seed fresh, and the land well fitted. The land should be

rolled after sowing. Early and frequent cultivation must be given, and two or three weedings by hand will be needed. Weeds must be kept down at any cost. When the tops fall and the stalks turn yellow near the bulbs, the onions should be pulled and spread on the field to dry. They should be stirred occasionally, and as soon as the tops are well dried they are to be cut near the bulbs. The latter will then be ready for market. If stored, they must be kept in a cool, well ventilated place, and only a small quantity should be put in a single package. For growing sets, 30 to 60 lbs. of seed per acre will be needed. They will ripen in Aug., and must be promptly harvested and be kept cool and dry. Very small ones are best, and any exceeding one-half inch in diameter should be rejected. The maggot is the principal enemy of the O. Deep sowing planting on new land, and prompt destruction of all infested plants, are the principal remedial measures. In the Middle States sowing for an early crop is sometimes done in the fall, but does not always prosper. Sets are to be planted two or three inches apart in drills as soon as the ground can be worked in the spring. They are sometimes put out in Oct. and left during the winter. Frequent cultivation must be given. Potato onions are grown from the small sections into which the bulb divides. When planted, these increase in size and give an early crop for use in a green state but are not desirable for keeping through the winter. Top onions are grown from small bulbs, clusters of which are produced on top of the stalks instead of seeds. The Bermuda O. grows to a large size, has a mild flavor and is very productive. Immense quantities are imported, and of late, southern truck-growers have engaged in its cultivation. The seed must be grown in a cooler climate than that of Bermuda. There are about 80 varieties of the O. grown from seed in the United States. Among the most popular are the Yellow Danvers, Red Wethersfield, Silver Skin, Red Globe, and Southport Globe. The Giant Rocca, and White Tripol are Italian varieties that thrive in the South. The Yellow Danvers and Silver Skin are the most popular kinds for sets.

ONIS'CUS : see WOODLOUSE.

ONKELOS, *onk'ē-los:* supposed author of an Aramaic version (Targum) of the Pentateuch. The name seems a corruption from that of Akilas, one of the Greek translators of the Old Testament (see AQUILA). The translation, said to be by O., is, in its present shape at least, the work probably of the Babylonian schools of the 3d and 4th c. after Christ. At first orally transmitted, various portions began to be collected and written in the 2d c., and were finally redacted about the time above mentioned. For the history of the origin and growth of Aramaic versions in general, see TARGUM. The idiom of O. closely resembles that of Ezra and Daniel. The translation itself is in accord with a sober and clear, though not a slavish exegesis, and keeps closely to its text in most instances. In some cases, however, where the meaning is not clear, it expands into a brief explanation or paraphrase, uniting the

latter sometimes with Haggadistic by-work, chosen with tact and taste, so as to please the people and not to offend the dignity of the subject. Frequently it differs entirely from the original, as far, e.g., as anthropomorphisms and anthropopathies—anything, in fact, which might seem derogatory to the Deity—are concerned. Further may be noticed a repugnance to bring the Divine Being into too close contact with man, indicated by the interposition of a kind of spiritual barrier (the 'Word,' 'Shechinah,' 'Glory') when a conversation, or the like, is reported between God and man. Its use lies partly in a linguistic, partly in a theological direction; but little has been done for its study as yet. Notwithstanding the numerous MSS. of it extant in almost all the larger libraries of Europe, and in spite of the grossly incorrect state of our current printed editions, no critical edition has ever been attempted.

ONLY, a. *ōn'lĭ* [AS. *ænlic*, only—from *an*, one; *lic*, like]: single; one alone; this and no other: AD. singly; merely; this and no otherwise; singly without more, as *only*-begotten.

ONOBRY'CHIS: see SAINTFOIN.

ONOCENTAUR, n. *ŏn'o-sĕn-tawr* [Gr. *onos*, an ass; *kentauros*, a centaur]: in *myth.*, a fabulous monster represented on ancient sculpture, with a body partly human and partly asinine.

ONOMACRITUS, *ŏn-o-măk'rĭ-tŭs:* priest and poet of anc. Greece, living at Athens, B.C. 530–480, in the time of the Peisistratidæ. He collected and expounded—according to Herodotus—the prophecies or oracles of Musæus (q.v.), but is said to have been banished from the city by Hipparchus, about B.C. 516, on account of interpolating something of his own in these oracles. He then, we are told, followed the Peisistratidæ into Persia, and while there was employed by them in a very dishonorable way. They got him to repeat to Xerxes all the ancient sayings that seemed to favor his meditated invasion of Greece. Some critics, among whom is Aristotle, have inferred from a passage in Pausanias that O. is the author of most of the so-called Orphic hymns. More nearly certain, however, is the view which represents him as inventor of the great Orphic myth of Dionysus Zagreus, and founder of Orphic religious societies and theology. Pausanias states that 'Onomacritus established orgies in honor of Dionysus, and in his poems represented the Titans as the authors of the sufferings of Dionysus.' See ORPHEUS: consult also the standard histories of Greece (as Grote's) and of Greek literature (as Mahaffy's).

ONOMANCY, n. *ŏn'ŏ-măn-sĭ*, or ON'OMAN'TIA, n. *-shĭ-ă* [Gr. *onŏma*, a name; *manteïa*, divination]: divination by the letters of a name. ON'OMAN'TIC, a. *-tĭk*, or ON'OMANTICAL, a. *tĭ-kăl*, pertaining to onomancy; predicted by names, or the letters composing them.

ONOMATOLOGY, n. *ŏn'ŏ-mă-tŏl'ŏ-jĭ* [Gr. *onoma*, a name; *logos*, discourse]: a treatise on the derivation of names, or the study of them as a science. ON'OMATOL'OGIST, n. *-jĭst*, one who.

ONOMATOPŒIA, n. *ŏn'ŏ-mă-tō-pē'yă* [Gr. *onŏma*, a name; *poiĕō*, I make]: in *philology*, the formation of words in imitation of the sounds which they represent; as to *buzz* as bees, to *creak* as a door, to *crackle* as burning twigs: other examples are—*cuckoo*, Lat. *cucu*(lus); *pee-wit*, Scan., *pee-weip*, Dutch, *kie-wit; cock; clash, rap, tap, quack, rumble, whizz, clang*. Such words are sometimes called onomatopœias; more properly, they are onomatopœian, or formed by onomatopœia. ONOMATOPOETIC, a. *ŏn'ŏ-mă-tō-pō-ĕt'ĭk:* resembling the sound signified.

Onomatopœia, in a more extended sense, is applied to the rhetorical artifice by which writers (chiefly poets) seek, through the choice and arrangement of words, to make the 'sound,' throughout whole phrases and sentences, 'an echo to the sense,' as in Homer's well-known *poluphloisboio thalasses*, expressive of the breaking of waves upon the seashore; or where Tennyson makes the sea

Roar rock-thwarted under bellowing caves.

The occurrence of so many obviously onomatopœian words in all known languages suggests the question, whether the same principle may not have been concerned in producing the original germs or roots of the great bulk of words. There is little prospect that the question will ever be conclusively settled either way; for the changes of time have made it, in most cases at least, impossible to say what the first form and signification of a root were; but the weight of arguments seems in favor of the affirmative answer. 'The action of the mind,' as it has been expressed, 'produced language by a spontaneous repercussion of the impressions received.' Now, the articulate sound first affixed in this way to an object or an action as its sign cannot be conceived as arbitrary; nor is there any mysterious and inherent correspondence between any one conception of the mind, and a particular articulate sound. The sound uttered must have been suggested by something connected with the object or action itself; and by what more naturally than by the inarticulate sound which the object or action itself emits?

The chief objection to this theory is, that if the first words were merely reproductions of natural sounds, the same natural objects would have had the same names all the world over. To this it is answered, that the mind in its first efforts at naming did not seek an exact reproduction of the sound, but a suggestive imitation; primitive words were not echoes, but 'artistic representations.' Now, the sounds of nature are not simple, but composite. Like other concrete phenomena, they present a variety of aspects; and according as one or another aspect seemed most prominent to the observer, a different vocal sound would suggest itself as the appropriate symbol. Thus, when Prof. Max Müller argues (*Science of Language*, Lond. 1861) that if the 'bow-wow' theory, as he nicknames it,

were true, men would have everywhere spoken of a *moo*, as is done in the nursery, and not of a *cow;* it seems a valid answer to say, that the Indian *gu*, the Teut. *kuh* (Eng. *cow*), and the Græco-Lat. *bou-*, are really as suggestive imitations of the animal's actual voice as *moo*. To take a more striking instance: few words differ more in sound and aspect than the Eng. thunder (Ger. *donner*, Lat. *tonitru*, Fr. *tonnerre*) does from the Mexican name for the same thing, *tlatlatnitzel*, and yet it would be difficult to say which is the more suggestive of the natural sound.

It is no doubt true that the great bulk of names are derived from roots having a general predicative power; but this by no means excludes the principle of onomatopœia. Thus, to take one of the instances adduced by Prof. Müller, that of *raven* or *crow* (Skr. *kárava*, Lat. *corvus*, Gr. *korōnē*); this is derived from the root *ru* or *kru*, which means to cry or call, and the bird was called a *kárava*, or crow, not in imitation of his voice, but because he was 'a shouter, a caller, a crier. The name might have been applied to many birds, but it became the traditional and recognized name of the crow.' But how came the articulation *ru* or *kru* to be chosen to convey the general meaning of crying or calling; may we not suppose that it was suggested by the voice of birds of the crow kind, whose notes are most markedly cries or calls to their fellows, as distinguished from singing? Once adopted in this particular case, it would naturally be extended to any kind of cry or call, from the harshest to the softest.

ONONDAGA, *ŏn-on-daw'ga*, LAKE: a lake in Onondaga co., N. Y., near Syracuse. It is 5 m. long by 1 m. wide; in some portions shallow, in others 65 ft. deep; and lies 361 ft. above the sea. It is near large salt springs, and is supposed to have been formed by the washing away of the salt rock which formerly occupied its location. Through a short outlet, the waters flow into Seneca river.

ONONDAGAS, *ŏn-on-daw'gaz:* one of the tribes of American Indians known as the Five Nations, or Iroquois. Their language was regarded as purer and stronger than the dialects of the other tribes, and was used at the meetings of the great council. At an early period the O. waged war with the Hurons and Algonquins, and later with the Eries and Susquehannas. They opened hostilities with the French, but made a treaty 1653, and requested the establishment of a mission. A settlement was made 1657, but the people fled the next year on the discovery of a plot to annihilate them. The O. invaded Montreal Island 1662, made peace, and allowed the re establishment of the French mission 1668. They became allies of the English, were punished by Frontenac 1696, made a treaty 1700, which they broke 1709. During the revolution the O. aided the English Most of their land was ceded to the state of New York 1788. About 400 O. live in Ontario, Can., a small number are with the Seneca and Tuscarora tribes, and about 350 are on a reservation about 4 m. sq. at the old home of the tribe a few m. from Syracuse. Schools are maintained and some of the people profess Christianity.

ONSET, n. *ŏn'sĕt* [*on*, and *set*]: a rushing or setting upon; a violent attack; first brunt.

ONSLAUGHT, n. *ŏn'slawt* [AS. *onslagan*, to destroy—from *on*, on; *slagan*, to strike, to slay] attack; assault; onset.

ONSTEAD, n. *ŏn'stĕd* [a corruption of *homestead*]: *Scotch* and *prov. Eng.*, a farmhouse.

ONTARIO, *ŏn-tā'rĭ-ō*, LAKE: easternmost and smallest of the five great lakes of North America, lies in 43° 10′—44° 8′ n. lat., and 76° 30′—80° w. long.; 190 m. in length, 55 m. in greatest width, about 480 m. in circumference. At its s.w. corner it receives the waters of the upper lakes by the Niagara, and at its n.e. corner it issues into the St. Lawrence; which for some distance below is called the Lake of the Thousand Isles. Its surface, which varies a few ft. with the seasons, is about 330 ft. below that of Lake Erie and 234 ft. above tidewater. Its bottom, therefore, must be considerably lower than the level of the Atlantic, as it is in some places 600 ft. deep. Sufficiently deep throughout for vessels of the largest tonnage, it has many convenient and thriving ports, of which the chief are Oswego, Sackett's Harbor, and Charlotte in the United States; and Kingston, Port Hope, Cobourg, Toronto, and Hamilton on the Canadian shore. Its navigation has been facilitated by the erection of 15 light-houses on the United States side, and 13 on the Canadian; while it is connected with Lake Erie by the Welland canal, with the Erie canal and New York by the Oswego canal, and by the Rideau canal with the Ottawa. Lake Ontario is subject to violent storms, and it is probably owing chiefly to the constant agitation of its waters that it freezes for only a few miles from the shore. The shores of Lake Ontario are generally very flat, but the Bay of Quinte, a long crooked arm of the lake, which stretches about 50 m., has some attractive scenery. Burlington Bay, on which Hamilton lies, is a large basin, almost inclosed by a natural, but strangely accumulated bank of sand, which forms a beautiful drive.

ONTARIO, *ŏn-tā'rĭ-ō*, PROVINCE OF: the most populous province belonging to the Dominion of Canada (see CANADA), and formerly known as Upper Canada or Canada West. The Ottawa river on the east separates it from Quebec, formerly Lower Canada. It occupies most of the St. Lawrence valley west of Quebec and north of the Great Lakes. It is bounded on the north by Keewatin, the Albany River, and James Bay, the southern extension of Hudson's Bay; on the south by lakes Ontario and Erie, the St. Lawrence and Niagara rivers, and the Lake of the Thousand Isles; on the east and northeast by the Ottawa River and the Province of Quebec; and on the west by the Province of Manitoba, lakes Superior, Huron and St. Clair, and the Detroit and St. Clair rivers. The area is given as 260,826 square miles, of which 40,354 square miles are water. Pop. (1881) 1,926,922; (1891) 2,114,321; (1901) 2,182,947. The population of the principal

cities (1901) was as follows: Toronto, provincial cap., 208,040; Ottawa, capital of the Dominion of Canada, 59,928; Hamilton, 52,634; London, 37,981; Kingston, 17,961.

Topography, Communication, Climate.—The peninsula between Lake Huron and Lakes Erie and Ontario is comparatively level and very fertile. The land around the Great Lakes is separated from the St. Lawrence valley by a range of hills, and in the upper part of the peninsula hills are interspersed with fertile valleys. In the northern and western portions of the province are hilly and wooded regions. The Great Lakes and canals furnish a shore line about 3,000 miles in extent, and several of the rivers are navigable for long distances. The principal canals are the Welland, 27 miles long, running east of and parallel to the Niagara River, and connecting Lake Erie with Lake Ontario, and the Sault Ste. Marie. The railroad interests of the province are well developed, there being more than 7,000 miles of railway, which with the canals and the natural water-ways furnish great commercial advantages. The climate varies greatly with the locality. In the north the winters are long and the temperature averages low, but in the southwest it varies little from that of the northern United States. The dryness of the air makes the cold less uncomfortable than the mercury would indicate, and in the greater part of the province the climate is healthful.

Natural Resources.—The mineral resources are great, and are found chiefly in the Huronian Rocks, which, with the Laurentian series, both of Archaean crystalline formation, constitute the principal geological characteristics of the region. Iron ores, galena, apatite, freestone, granite, and marble are found in the eastern and central portions; and in other parts of the province, especially in the northwest, are deposits of gold-bearing quartz, silver, lead, plumbago, arsenic, antimony, platinum, cobalt, zinc, copper, and nickel; veins of plumbago, and immense quantities of fine marble; slate for roofing purposes, millstones, and grindstones. There are also large quantities of limestone, clay suitable for brick and tile, gypsum, and marl. In the southwestern part of Ontario are remarkably productive petroleum wells, and great quantities of salt are made from brine obtained from wells at and near Goderich. Natural gas is found in large quantities in the west near Detroit and in the east near Niagara, the yield being valued at about $533,446 annually. In 1906 the value of the mineral production of Ontario was $22,221,808, the chief items being nickel $3,836,419, silver $3,543,089, pig iron $4,554,247, copper $998,548, portland cement $2,381,014, total brick and tile $2,792,295, crude petroleum $761,546, building and crushed stone $660,000, salt $367,738, lime $496,785, natural gas $533,446, and carbide of calcium $162,780. There were 11,151 persons engaged in mining and their wages aggregated $5,082,653. A bureau of mines was established in 1891.

ONTARIO.
SCALE OF STATUTE MILES.
0 5 10 20 30 40 50 60 70 80 90 100
Copyright, 1904, by Rand, McNally & Co.
Longitude West from Greenwich.
WESTERN PART OF ONTARIO.
SCALE OF STATUTE MILES.
0 50 100 150 200
RAND, MC NALLY & CO., ENGR'S, CHICAGO.

The lumber interest is extensive, and large quantities of pine are exported. Oak, spruce, tamarack, hickory, and various other hardwood trees abound, and a great variety of the soft woods. To a certain extent the forests are controlled by law. The fisheries are important and are under government supervision. The catch consists chiefly of trout, whitefish, herring, pickerel, etc., and in 1906 was valued at $1,734,865. Among the animals are deer, elk, moose, caribou, mink, skunk, bear, beaver, wolf, fox, otter, and raccoon, and there are wild turkeys, geese, ducks, partridges, and other valuable game birds.

Agriculture.—Of the cultivated crops, wheat, barley, oats, rye, peas, and corn are largely grown and large quantities of clover seed are produced. Roots, especially turnips and mangolds, are grown for stock, and potatoes yield large crops. Beans, buckwheat, hemp, hops, sorghum, and tobacco are grown in limited areas. Apples, pears, peaches, plums, and cherries, and the various small fruits thrive in portions of the province. In 1905 the farm lands were valued at $649,201,364; buildings $264,384,514; implements $68,629,546; live stock $172,483,103; total $1,154,698,527. The crops and acreage in 1906 were as follows: Fall wheat 787,287 acres, 18,841,774 bushels; spring wheat 171,745 acres, 3,267,000 bushels; barley 756,163 acres, 25,253,011 bushels; oats 2,716,711 acres, 108,341,455 bushels; peas 410,356 acres, 7,388,987 bushels; beans 31,272 acres, 950,312 bushels; rye 79,870 acres, 1,327,582 bushels; buckwheat 106,444 acres, 1,792,903 bushels; potatoes 136,064 acres, 15,020,299 bushels; carrots 4,980 acres, 1,598,698 bushels; mangel-wurzels 69,352 acres, 32,863,192 bushels; turnips 132,512 acres, 57,060,151 bushels. The live-stock and dairy interests are important. Cheese-making is one of the most profitable industries. In 1906 the live stock consisted of 688,147 horses, 2,963,618 cattle, 1,304,809 sheep, 1,819,778 swine, and 10,254,834 poultry. The products of the 1,167 cheese factories were valued at $12,269,073 in 1901; the wool-clip in 1906 amounted to 4,543,981 lbs., and the live stock sold or slaughtered numbered 3,603,411 head. Tile draining is extensively practiced, and improved farm implements and machines have been largely introduced. An experimental farm has been established at Ottawa by the Dominion government for Ontario and Quebec; and at the Farmers' Institutes, opened 1884, lecturers are employed by the government. The cabinet office of the minister of agriculture was instituted in 1888.

Manufactures and Commerce.—Manufactures are quite extensive and include agricultural implements and machines, lumber and its by-products, railway rolling stock including locomotives, flax, soap, sewing machines, edged tools, woolen and cotton goods, boots, shoes, woodenware, stoves, hardware, paper, carriages, and furniture. The power, derived from the falls in the Ottawa River, the Rapids of the St. Lawrence, has been a large factor in the development of the manufacturing industries of the

province and the extensive water-power works on the Ontario side of the Niagara Falls have further aided in developing them. According to the census of 1901 the capital of the manufacturing establishments in Ontario was $214,972,275; salaries and wages $56,548,286; miscellaneous expenses $10,568,861; cost of material used $138,230,400; and the value of products was $241,533,486. The principal articles of export are manufactured goods, timber, minerals, agricultural products, animals and their products, etc., the total value in 1902 being $48,597,480. The imports were valued at $85,235,418, and the chief article was coal.

Finance and Banking.—The receipts of the province during the calendar year 1904 were $6,128,358 and the expenditures $5,267,453. The total liabilities were $17,846,673, consisting of $11,709,649 direct and $5,975,024 indirect liabilities. The balance in banks 1905, Jan. 1, was $2,855,584. The estimated revenues for 1905 were $5,515,269, and the expenses $5,079,789. The revenue is made up of subsidies and contributions from the Dominion treasury and from parol land and lumber sales, licenses, stamps, etc. The expenditure is invariably under the revenue. In 1906 there were 24 national, savings and other banks in the province, with $83,354,558 capital; liabilities $709,204,327; assets $882,413,437 and total deposits of $520,989,365. The Friendly Societies in 1906 had $11,168,896 in assets, and $1,405,630,654 insurance in force.

Education and Religion.—Education receives much attention. Schools are thoroughly graded and under government control, the minister of education, who is also a member of the Provincial Cabinet, having complete charge of all matters pertaining to education. Education is free to all and the schools are supported by a property tax and state grants. The Roman Catholics may have and do establish separate schools, receiving a separate grant from the government. They are then exempt from taxation in support of the regular public schools. There are 81 schools for Indian children, 10 normal schools, 12 normal colleges, 55 country model schools, art schools, and 117 free libraries under the care of the board of education. The public schools number 6,062; the separate schools 391; the high schools 134. At the head of the educational system stands Toronto University (q.v.), aided by provincial funds. Other universities include Queen's at Kingston and Victoria, Trinity, McMaster, etc., affiliated with Toronto University, and the Upper Canada College, at Toronto; many Roman Catholic and other denominational institutions of learning; and an agricultural college at Guelph. By act of the government, 1887, the English language is required to be taught in every school. In many schools French had been the only language used. There is no state religion. Of the religious denominations the various Methodist bodies are most numerous; the Anglican Church has 3 dioceses; the Roman Catholic Church has

1 archbishop and 4 bishops; and the Congregational, Baptists, Presbyterian and other denominations have large memberships. According to the census of 1901 the statistics for the various denominations were as follows: Methodist, 666,360; Presbyterian, 447,383; Roman Catholic, 390,355; Church of England, 367,940; Baptist, 116,-426; other denominations, 156,000.

Population.—The population in 1901 was 2,182,947, as compared with 2,114,321 in 1891, showing an increase of less than 2½ per cent., although the province contains about two-fifths of the population of the Dominion. The majority of the population is of English descent, Scotch, however, predominating in Bruce, Grey, and Glengary counties; Irish, German, and other nationalities are found around Toronto. Formerly the population centred about Ottawa and the peninsular portions of the province, but it is now scattered more evenly throughout the entire province, the largest increases being in the mining districts north of lakes Huron and Superior. There are about 21,000 Indians.

Government and History.—For administrative purposes the province is divided into 44 counties, subdivided into townships and 97 electoral districts, including the three unorganized districts of Algoma, Thunder Bay, and Rainy River. A licutenant-governor, appointed by the governor-general of the Dominion, for 5 years, is at the head of the provincial government. He is assisted by a responsible ministry. There is but one legislative body; it has 98 members, elected for a term of 4 years. In the Dominion parliament Ontario has 24 senators and 86 members of the House of Commons. The former are appointed by the governor-general; the latter are elected.

Trading posts were established in Ontario early in the 17th century, but it was not permanently settled till long afterward. It was ceded, with the remainder of Canada, to Great Britain by France in 1763; was merged in the province of Quebec 1774; was separated and known as Upper Canada 1791; reunited with Quebec and called Canada 1841; was again separated, became the province of Ontario, and united with the other provinces in forming the Dominion of Canada in 1867. During the war of 1812 several battles were fought on its territory, a rebellion occurred 1837-8, and it was invaded by Fenians 1866. Consult Hopkins, *Canada: an Encyclopedia of the Country; The Statistical Year Book of Canada* (annual); Annual *Reports* of the Ontario Bureau of Industries, the Bureau of Mines, Minister of Education and the Geological Survey; McMullen, *History of Canada* (1868); Dent, *Story of the Upper Canadian Rebellion* (1885); and *Last Forty Years;* Smith, *Political History of Canada;* Selwyn and Dawson, *Descriptive Sketch of the Physical Geography and Geology of Canada* (1884); McIlwraith, *Birds of Ontario* (1887); Millar, *Educational Systems of the Province of Ontario* (1893).

ONTARIO AGRICULTURAL COLLEGE, The: this

institution, located at Guelph, Canada, was founded in the year 1874, with a staff of six officers, and it was opened in the same year with an attendance of 28 students. For four years the school struggled on, first under one principal and then under another, until in 1879 Dr. James Mills was appointed to the presidency. From that time to the present the college grew steadily in equipment, attendance, and popularity, and it now embraces a plant worth nearly a million dollars, with well-equipped departments of animal and field husbandry, veterinary science, horticulture, dairying, domestic science, and nature study, a full set of large and substantial farm buildings, a farm of 550 acres, residences for both male and female students, and first-class laboratories for chemistry, physics, biology, and bacteriology, provided with apparatus for student instruction and for scientific research work, and an efficient staff of 35 instructors and officers. The institution provides the following courses:

Agriculture.—A two years' course leading to a diploma entitling the holder to the Status of Associate of the College and designed especially to train men for the farm. A four years' course leading to the Degree of Bachelor of the Science of Agriculture and designed to train men more completely in the sciences underlying practical agriculture and to fit them for professional agricultural pursuits. Various short courses in Dairying, Stock and Seed Judging, Poultry Raising, etc., and lasting for periods varying from two weeks to three months.

Domestic Science Courses including professional courses for teachers and non-professional housekeepers' courses.

Nature Study Courses for the training of teachers in rural schools.

ONTOGENESIS, *ŏn'tō-jĕn'ē-sĭs* [Gr. *ὄντα* the things which exist; *γένεσις* root of *γίγνεθαι* to be born; akin to L. *genus*, birth; race]: the development of an individual organism. Distinguished from phylogenesis, the evolution of a species. The physical development of an individual is believed by some embryologists to recapitulate the series of biological phases through which its ancestors have passed. All organisms proceed from a unicellular form, through regular gradations, to the adult form. (See EVOLUTION.)

ONTOLOGY, *ŏn-tŏl'ō-jĭ* [Gr. *on*, being, and *logos*, doctrine]: a philosophical term applied to that branch of metaphysical investigation which deals primarily with reality. In this particular it would be distinguished from epistemology (q.v.) the science of ultimate knowledge. The term has not been used consistently at all periods. As applied to a special form of philosophy its latest exponent is perhaps the doctrine of the Italian Gioberti (1801-52), who attempts to start philosophy on the search for the ultimate facts about *objects*, rather than, as in most modern systems he held is the case, by examining the inner facts of mental life.

ONUS, n. *ō′nŭs* [L. *onus*, the burden]: the first word of the L. phrase ONUS PROBANDI, *ō′nŭs prō-băn′dĭ*, the burden of proving; the burden or obligation; the task. In law, the *onus probandi* is often a difficult question in litigation; but as a general rule, the plaintiff who institutes the suit is bound to give proof of the allegations on which he relies. There are many nice and technical rules on the subject, both in suits and in actions.

ONWARD, a. *ŏn′wĕrd* [AS. *cnweard*—from *on*, in, upon, and *weard*, expressing direction]: increased; advanced; progressing; improved; leading forward. ON′WARD, ad., or ON′WARDS, ad. *-wĕrdz*, toward a state of advanced progression; a little farther or forward; progressively.

ONYCHA, n. *ŏn′ĭ-kă* [Gr. *onux* or *on′ŭcha*, a claw, a nail: L. *onyx*]: the shell of the E. India onyx-fish; the onyx.

ONYCHIA, n. *ŏn-ĭk′ĭ-ă* [Gr. *onux* or *on′ŭcha*, a claw, a nail]: a disease of the nail; a whitlow.

ONYCHOMANCY, n. *ŏn′ĭ-kō-măn′sĭ* [Gr. *onux* or *on′ŭcha*, a claw, a nail; *manteïa*, divination]: divination by the appearance of the nails of the fingers.

ONYX, n. *ŏn′ĭks* [Gr. *onux;* L. *onyx*, a nail of the hand]: general name for those varieties of the agate which consist of alternate layers of white, brown, or black; rarely, a third color of stripes occurs. The finest specimens are brought from India. O. is in much esteem for ornamental purposes. The ancients valued it very highly for cameos. Many of the finest cameos in existence are of onyx. The name O., however, appears to have been applied by the ancients more extensively that it now is, and even to striped calcareous alabaster, such as is now called Onyx Marble (q.v.). The *Sardonyx* of the ancients is a variety of O., in which white stripes alternate with stripes of a dark-red variety of carnelian, called *sard* or *sarda:* it is one of the rarest and most beautiful kinds of O., and is more valued than carnelian.—In *ophthalmology*, O. is an abscess of the cornea of the eye, by which it becomes opaque.

ON′YX MAR′BLE: very beautiful material, which came into general notice first at the London Exhibition of 1862. It is a stalagmitic formation, discovered by the French in making roads in the province of Oran in Algiers. It is a translucent limestone, containing traces of magnesia and carbonate of iron; specific gravity 2·730. Artistic workmen of France manufacture of it very beautiful ornamental works.

OODEYPUR′: see ODEYPOOR.

OOGONIUM, n. *ō′ŏg-ō′nĭ-ŭm*, O′OGO′NIA, n. plu. *-ō′nĭ-ă* [Gr. *ōŏn*, an egg; *genos*, offspring]: the special organ in which the oosphere is contained; a kind of ovarian sac containing spores which form oospores or zoospores when set free.

OOJEIN′: see UJEIN.

OOLACHAN: see CANDLE-FISH.

OOLITE.—OOLITE GROUP.

OOLITE, n. *ō′ŏ-līt* [Gr. *ōŏn,* an egg; *lithos,* a stone]: variety of limestone—often very pure calcareous spar; named from its being composed of small rounded grains resembling the eggs or roe of a fish, connected by a calcareous cement: it is sometimes called roestone. The grains are frequently hollow. Many oolites are excellent building-stones. There is no important mineralogical difference between O. and *Pisolite,* or pea-stone. O., as a geological term, is extended far beyond its mineralogical and original signification. In *geol.* O. is a secondary formation or system; same as *Jurassic:* see JURA: JURASSIC. OOLITIC, a. *ō′ŏ-lĭt′ĭk,* pert. to the Oolite system, or classed with it: see OOLITE (or JURASSIC) GROUP (below). OOLITHES, n. plu. *ō′ŏ-lĭthz* or *ō′ŏ-lithz,* a general term for the fossil eggs of birds, reptiles, etc.

O′OLITE (or JURAS′SIC) GROUP (in Geology): extensive and important series of strata of secondary age, underlying the chalk formation, and resting on the Trias. In Britain they received the name Oolite, because in the district where they were first examined and described by Dr. William Smith, the limestones contained in them had an oolitic structure (see OOLITE, above). The name Jurassic has been given to them on the European continent, because the range of the Jura Mountains in n.w. Switzerland is almost entirely composed of them (see JURA). The strata have been arranged in the following order. The maximum thickness of each division is given in feet.

	Feet.	
Upper Oolite.		
1. Purbeck Beds	200	
2. Portland Beds	170	
3. Kimmeridge Clay	600	
		970
Middle Oolite.		
4. Coral Rag	190	
5. Oxford Clay	600	
		790
Lower Oolite.		
6. Cornbrash and Forest Marble	80	
7. Great Oolite and Stonesfield Slate	150	
8. Fuller's Earth	150	
9. Inferior Oolite	250	
		630
Lias.		
10. Upper Lias	300	
11. Marlstone	200	
12. Lower Lias	600	
		1100
Total		3490

It is apparent from this table that the oolitic rocks consist of three extensive clay deposits, each the basis of a smaller and variable set of sands and limestones; the Upper Oolites resting on the Kimmeridge Clay, the Coral Rag on the Oxford Clay, and the Lower Oolite on the Lias.

1. The Purbeck beds, unlike the other oolitic rocks, are chiefly freshwater deposits. Though lithologically they are very similar throughout, the peculiarities of the contained fossils have caused them to be grouped into three series—the Upper, Middle, and Lower. The Upper Pur-

becks are purely freshwater, containing beds of limestone and shale, which abound in shells of lake and river mollusca and cyprides. The stone called Purbeck Marble, formerly extensively used in the ornamental architecture of English churches and other buildings, belongs to this division; it consists of the shells of Paludinæ, held together by a somewhat argillaceous paste. The Middle Purbecks are partly freshwater, and partly brackish or marine. The 'cinder-bed,' composed of a vast accumulation of shells of *Ostrea distorta*, occurs in this section, and near it is the narrow layer from which were obtained the remains of several mammalia. The Lower Purbecks are chiefly freshwater, with some interealated brackish or marine beds, and one or two old vegetable soils called by the quarrymen 'dirt-beds,' which contain stems of Cycadaceous and Coniferous plants. 2. The Portland beds consist of oolitic and other limestones interstratified with clays, and passing below into sands and sandstones, from which the well-known building-stone is obtained, of which St. Paul's and many principal buildings in London are built. 3. The Kimmeridge Clay is generally a dark-gray bituminous shale, with intercalated beds of sand, calcareous grit, and layers of septaria: the dark shale in some places passes into an impure brown shaly coal. 4. The Coral Rag contains, as its name implies, abundance of corals, in bluish limestone beds mixed with layers of calcareous grit: the Solenhofen lithographic stone, with its beautifully preserved and varied fossil remains, belongs to this division. 5. The Oxford Clay is a dark-blue or blackish clay without corals, but having a large number of beautifully preserved Ammonites and Belemnites: beds of calcareous sandstone, called Kelloway Rock, occur in its lower portion. 6. The Cornbrash consists of thin beds of cream-colored limestone, with sandstones and clays; and the Forest Marble (so named from Wychwood Forest) is composed of an argillaceous limestone, with numerous marine fossils, blue marls and shales, and yellow silicious sand: at Bradford, Wiltshire, the Forest Marble is replaced by a considerable thickness of blue unctuous clay. 7. The Great Oolite is composed of shelly limestones, sandstones, and shelly calcareous sandstones, and the Stonesfield Slate is a slightly oolitic shelly limestone, which splits into very thin slabs, erroneously called 'slates;' it is remarkable for the remains of terrestrial reptiles and mammals found in it: the Bath Oolite, well-known building stone, belongs to this division. 8. The Fuller's Earth group is a local deposit found near Bath; it consists of a series of blue and yellow shales and marls, some of which have properties fitting them for the use of the fuller. 9. The Inferior Oolite is composed of a series of beds of pisolitic and shelly limestones, brown marl, and brown sandy limestone, all abounding in fossils. 10. The Lias (q.v.) is a great clay deposit; divided into the Upper and Lower Lias, which consist of thin beds of limestone scattered through a great thickness of blue clay, and, separating these two groups, the Marlstone, or calcareous or ferruginous sandstone: the Lias abounds in beautifully preserved fossils.

OOLITE GROUP.

The oolite occupies, in England, a zone nearly 30 m. in breadth, extending across the country from Yorkshire to Dorsetshire. On the continent of Europe rocks of this age occur in Germany and France, but they have been most extensively studied in the Jura Mountains, 6,000 ft. in height, composed of oolite and cretaceous rocks. The strata are greatly bent and contorted, and as they approach the Swiss Alps, the great mass of which also is of oolite, they become completely metamorphosed into clay slates, mica schists, gneiss, and crystalline limestones. Beds of O. have been noticed in Cutch, in India. In Australia similar beds occur on the western coast, and probably some of the coal-beds of New South Wales, Victoria, and Tasmania belong to the oolite. In N. and S. America, fossils, apparently of oolitic age, have been found in the e. ranges of the Rocky Mountains, and on the w. side of the watershed; but these deposits require to be more exactly examined. So far as known the O. is of unimportant extent in N. America.

The O. is remarkable for the abundance of its fossils, and is in this respect in striking contrast to the immediately preceding Triassic and Permian periods. The several freshwater deposits, and the ancient vegetable surfaces, contain the remains of a considerable number of plants. Ferns abound, and associated with them are species evidently related to the living genera *Cupressus*, *Araucaria*, and *Zamia*.

Corals abound in several of the beds. The brachiopods are the only division of mollusca not largely represented. The conchifers and gasteropods show a great number and variety of new genera, nearer the forms of the present day than those that preceded them. But the remarkable feature of molluscan life is the enormous development of the cephalopods. Whole beds are almost entirely of their shells. No less than 600 species of ammonites have been described, chiefly from the rocks of this period, and the belemnites also were very numerous. The crinoids have become scarce, but are replaced by star-fishes and sea-urchins. The freshwater beds contain the remains of many insect forms. The heterocercal-tailed fish give way to the more modern homocercals, and the true sharks and rays make their appearance, though the old cestracionts are still represented by some survivors. The characteristic feature of the oolitic period was its reptiles. The land, the sea, and the air had each their inhabitants of this class. The various species of pterodactyles, some not larger than the bat, others surpassing, in the stretch of their membranous 'wing,' the size of the largest living bird, were the terrors of the air; while their allies, the monster ichthyosaurs and plesiosaurs, held the mastery of the waters; and the huge megalosaurs, some not less than 30 ft. in length, trod the earth. The few mammalian remains hitherto found, have special interest from their antiquity, being the first evidence of this high order of animals on the globe. They belong, apparently, to marsupial animals; one species is, however, supposed by Owen to have been a hoofed and herbivorous placental mammal.

OOLOGY, n. *ō-ŏl'ŏ-jĭ* [Gr. *ōŏn*, an egg; *logos*, discourse]: the science that deals with eggs in relation to their size, shape, color, etc., and with the nests of birds.

The collecting of birds' eggs has always possessed a peculiar fascination for some men, and in the attempt to claim for their pursuit a legitimate place in scientific work they have coined for it the term Oology. A famous naturalist once said that when the oologist prepared his specimens he blew all the science out through the hole in the shell, and there is much truth in the statement. The benefit that ornithology gains from the study of a cabinet full of empty egg-shells is so slight that it is not worth the sacrifice of bird-life that the collecting entails. While the relationship between certain groups of birds is indicated in the character of their eggs, as, for instance, between the shore-birds and the gulls and terns, nevertheless the variability, in size, shape, and color is so great, within many groups, that it is impossible to form any systematic arrangement from a study of eggs alone, and it is only now and then in connection with other characters that they prove of assistance in defining a natural arrangement of birds. The significance of their shape, colors, etc., is discussed under Egg.

In collecting eggs for scientific purposes the greatest care should be exercised in positively identifying the bird to which they belong, without which data they are absolutely worthless. The nest, which is quite as important as the eggs, should also be preserved with great care, keeping it *in situ*, if possible, and all details of its location, the date of the collecting, etc., should be recorded. The method of preparing egg-shells for the cabinet is explained in many books, and many instruments have been devised for the purpose. Suffice it to say that a round hole should be drilled with an egg-drill on one side of the egg, the size depending upon the degree of advance in incubation, and the contents should be removed by the use of a fine-pointed blow-pipe. Jets of water may be used effectively to aid in emptying the shell, and should be used in washing it out, while various chemical solvents may be of assistance in dissolving well-formed embryos. Every egg-shell should bear a number corresponding to its record. Directions for the collection, preservation and care of birds' eggs are published by the Smithsonian Institution.

Probably the finest illustrated work on the oology of any region is Bendire, *Life Histories of the Birds of North America* (1892; unfinished). Other works are: Lefevre, *Atlas des Œufs des Oiseaux d'Europe* (1845); Hewitson, *Eggs of British Birds* (1856); Bädeker, *Die Eier der Europäischen Vögel* (1863); *Des Murs Traité général d'Oologie Ornithologique* (1860).

OOMRAWUTTI, *ôm-ra-wŭt'tē*, or Amrawati, *âm-ra-wât'ē*: important commercial town of Brit. India, province of Berar, 86 m. w. by s. from Nagpore, on one of the headwaters of the Purna, a branch of the Tapti. The dist.

which contains it was ceded by the Nizam to the British govt.; and transit-duties, which formerly interfered with the commerce of the town, have been abolished. Several considerable business firms are established here; and the chief merchants of Upper India and of Bombay have agents, who often make advances to the cotton cultivators of the surrounding country, on security of their crop. There are large cotton warehouses at Oomrawutti. Pop. about 25,000.

OONALAS'KA. See UNALASHKA.

OONOSCOPE, n. *ō-ŏn'ō-skōp* [Gr. *ōŏn*, an egg; *skopĕō*, I see]: a contrivance, with two eye-pieces for inspecting eggs and ascertaining their quality.

OOPHORIDIUM, n. *ō-ŏf'ŏr-ĭd'ĭ-ŭm* [Gr. *ōŏn*, an egg; *phoros*, fruitful—from *pherō*, I bear]: in *bot.*, an organ in the Lycopodiaceæ containing large spores.

OORALSK'. See URALSK.

OORFA, or URFA, *ôr'fâ:* modern name of EDESSA, which see.

OOR'GA. See URGA.

OORI, *ô'rĭ* (or LIMPOPO, *lĭm-pō'pō*), RIVER: important river system of s.e. Africa, rising lat. 26° s. in the high plateau called the Magaliesberg, which forms the n. limit of the basin of the Orange river. Throughout a great part of its course, the Limpopo bounds on the n. the Transvaal territory which its s. affluents drain. It flows n.e. through the plateau in which it rises, then turns sharply s.e. and s., entering the lowlands. It reaches the Indian Ocean about 100 m. n. of Delagoa—considerably further s. than was till recently supposed. Its course cannot be less than 800 or 900 m.; and it has numerous large tributaries, the Mariqua, Lipalula, etc. Yet, like most s. African rivers, it is navigable only 60 m. from its mouth, which is blocked by a double bar.

OO'RIAL, URIAL, or SHA: a large wild sheep (*ovis vignei*) inhabiting the high Himalayas and Tibetan plateaus and eastward to Persia, the chase of which calls for the greatest endurance, skill and resolution on the part of the hunters. The rams have immense, rounded, coiling horns; and while both sexes vary much in color, they agree in the habit of wandering widely.

OOROOMIE'YAH, or URUMEYAH. See OROOMIAH.

OOSPHERE, n. *ō ŏ-sfēr* [Gr. *ōŏn*, an egg; *sphaira*, a globe]: the ovum or germ-cell in the lower plants.

OOSPORANGIA, n. plu. *ō-ŏs'pōr-ăn'jĭ-ă* [Gr. *ōŏn*, an egg; *spora*, seed; *anggos*, a vessel]: in *bot.*, sacs or spore-cases in some Algæ.

OOSPORE, n. *ō'ŏs-pōr*, OOSPORES, n. plu. *ō'ŏs-pōrz* [Gr. *ōŏn*, an egg; *spora*, seed]: in *bot.*, a fertilized spore in fungi: the oosphere after fertilization.

OOSTERHOUT, *ōs'tĕr-howt:* Dutch town in N. Brabant, in a well-wooded fertile district. Nearly all the people are Rom. Catholics. Much business is done in grain and cattle, and there are tan-yards, beer-breweries, potteries, and brick-works. Pop. 9,853.

OOTACAMUND, *ô-tâ-kâ-mŭnd'* (*Utakamand*): chief town in the Neilgherry Hills, India, the great sanatorium of the Madras presidency, and the summer headquarters of the gov. of Madras. It stands on a plateau, in an amphitheatre surrounded by noble hills, and is 7,228 ft. above sea-level; the mean temperature being about 49°, maximum 76°, minimum 38°. The average rainfall is 45 inches. It is only about 350 m. from Madras, and is easy of access, as the railway now conveys the traveller to the foot of the Hills. There are thriving plantations of tea and coffee, and the cinchona or quinine plant. The first house was built 1821. Pop. about 10,000

OOTRUM, *ô'trŭm:* Indian fibre, from the stem of *Dæmia extensa,* plant of nat. order *Asclepiadaceæ,* abundant in many parts of Hindustan. The fibre is soft, white, silky, and strong, and is regarded as a promising substitute for flax.

OOZE, n. *ôz* [AS. *wos,* juice: Icel. *vas,* moisture: Norw. *vaasa,* to work in the wet and exposure: Gael. *uisge,* water]: soft mud or slime; a soft flow or issue; the liquid of a tan-vat: V. to flow or issue forth gently; to precolate, as a liquid, through pores or small openings. Oo'zing, imp.: N. that which oozes. Oozed, pp. *ôzd.* Oozy, a. *ô'zĭ,* slimy; containing soft mud. Atlantic ooze, a deep-sea calcareous mud, composed chiefly of the microscopic shells or shields of foraminifera. Limestone is mostly of animal origin, though often much altered. Chalk is manifestly so. It often contains embedded in it, shells and other animal remains visible to the naked eye, showing it must have been deposited in the sea. The grains that form the mass of chalk, when examined under the microscope, are found to be the shells, broken or entire, of foraminifera. Myriads of these creatures people at this day the waters of the Atlantic near the surface, and as they die, their shells sink down in an incessant drizzle, adding year by year to the thickness of the gray *ooze* that covers great areas of the sea bottom. Under the microscope, particles of this ooze exactly resemble particles of chalk. Mixed with the calcareous remains in the ooze there is a quantity of silica consisting of remains of organisms that secrete silicious coverings and skeletons. This accounts for the flint nodules in chalk, and the concretions of quartz in limestone.

OPACITY, n. *ō-păs'ĭ-tĭ* [F. *opacité*—from L. *opacĭtas,* shadiness—from *opācus,* dusky; dark: It. *opacita*]: want of transparency; darkness; gloom; obscurity. Opacous, a. *ō-pā'kŭs,* in *OE.,* dark; obscure.

OPAH, *ō'pa*, or KING'-FISH (*Lampris guttatus* or *L. luna*): fish of the Dory (q.v.) family (*Zeïdæ*), common in northern seas, found in the Atlantic and Arctic oceans, and in the Pacific, on the coasts of China and Japan, though it is a deep-sea fish, and its special home is near Madeira and the Azores. It is of oval form, greatly compressed, with small thin scales, the mouth small and destitute of teeth, a single dorsal fin much elevated in front and extending almost to the tail. This fish attains large size, being sometimes five ft. long and 150 lbs. in weight. It is gorgeously colored, surpassing even the dolphins; the upper part of the back and sides rich green, reflecting purple and gold in different lights, the lower parts yellowish-green, round yellowish-white spots above and below the lateral line; all the fins bright vermilion. The flesh is much esteemed; it is red like salmon, and is said to resemble it in flavor.

OPAL, n. *ō'păl* [F. *opale*—from L. *opălus;* Gr. *opallĭŏs*, the opal: Pol. *palac*, to glow, to blaze: Serv. *opaliti*, to give fire]: kind of resinous quartz of milk-white, red-brown, green, and pearl-gray color. OPALESCE, v. *ō'păl-ĕs'*, to exhibit a play of colors like the opal. O'PALES'-CING, imp. O'PALESCED', pp. *-ĕst'*. O'PALES'CENT, a. *-ĕs'ĕnt*, milky and iridescent like the opal. O'PALES'CENCE, n. *-ĕns*, the reflection of a milky and iridescent light. OPALOID, a. *ō-pa-loyd* [Gr. *eidos*, appearance]: like opal; iridescent. OPALINE, a. *ō'pă-lĭn*, pertaining to the opal. OPALIZE, v. *ō'păl-īz*, to convert into a substance resembling opal. O'PALIZING, imp. O'PALIZED, pp. *-īzd:* ADJ. converted into a substance resembling opal.—*Opal* differs from quartz in containing 5 to 13 per cent. of water, its only other essential constituent being silica, though a little alumina, oxide of iron, etc., is often present. It is never found crystallized, and does not exhibit a crystalline structure like quartz. It has a conchoidal fracture, and is very easily broken. There are many varieties, which pass into one another, so that their precise limits cannot be defined, from which has arisen no little confusion of names. The finest kind is called *Precious O.* or *Noble O.*, and sometimes *Oriental Opal.* It is semi-transparent or translucent, usually of bluish or yellowish white color, yellow by transmitted light, and exhibits a beautiful play of brilliant colors, owing to minute fissures which refract the light. It is much valued for setting in rings, brooches, etc., and is polished with a convex surface, never cut into facets, both because of its brittleness, and because its play of colors is thus best exhibited. The ancients valued opals very highly. The Roman senator Nonius preferred exile to giving up an O. to Mark Antony. This O. was still to be seen in the days of Pliny, who ascribes to it a value equal to more than $500.000. The imperial cabinet of Vienna contains the most celebrated O. now known to exist. It is five inches by two inches and a half. Almost all the finest opals are brought from Kaschau in Hungary, where they are found scattered in a trachytic conglomerate. They are mostly very small, but even a very small O., if

really beautiful, is worth $20 to $25; and the price increases very rapidly with increase of size. Precious O. is found also in Saxony, in S. America, etc. When the colors are not equally diffused, but in detached spots, jewellers call it *Harlequin Opal.* There is a dark or blackish variety, apparently tinged by oxide of iron, which occasionally exhibits very beautiful reflections, and is then much prized. *Girasol* (q.v.) and *Cacholong* (q.v.) are varieties of opal. What lapidaries call *Prime d'Opal* is clay-porphyry, or other stone containing many small grains of opal. It is cut into slabs, and made into boxes and other ornamental articles; the stone which contains the opals being often artificially blackened by boiling in oil, and afterward exposing to a moderate heat.—*Common O.* is semi-transparent, white, yellow, green, red, or brown, and does not exhibit any play of colors. It is not a rare mineral, and is found chiefly in clay-porphyry. *Semi-opal* is more opaque. *Wood O.* is a petrifaction, and exhibits the form and structure of wood, the place of which has been taken by the siliceous mineral. *Hyalite* and *Menilite* are varieties of opal.

OPAQUE, a. *ō-pāk'* [F. *opaque*—from L. *opācus*, dark]: not transparent; obscure; dark. OPAQUE'LY, ad. *-lĭ.* OPAQUE'NESS, n. *-nĕs*, the want of transparency.

OPE, *ōp:* poetic for *open.*

OPEIDOSCOPE, *ō-pī'dō-skōp* [Gr. *ops*, voice, word; *eidos*, form; *skopein*, see]: instrument for illustrating sound by means of light. It may be regarded as an inchoate Photophone (q.v.); the rays from the vibrating mirror are in the O. thrown on a screen.

OPELIKA, *ŏp-ė-lī'ka:* city, cap. of Lee co., Ala., at the junction of the Western Alabama, the Columbus and Western, and the East Alabama railroads; 28 m. from Columbus, Ga., 113 m. from Atlanta. It is in a grain and cotton growing country, and has manufactures of flour and cotton-seed oil; also knitting-mills, marble-works, and artificial-ice factory. There are 10 churches (Presb., Prot. Episc., Bapt., Primitive Bapt., Meth. Episc. South, 3 colored Meth. Episc., and 2 colored Bapt.); 1 graded school, 1 chartered seminary, 2 private schools for white children, and 4 colored schools; 1 national bank (cap. $100,000), and 1 state bank (cap. $50,000), and 1 semi-weekly and 1 weekly newspaper. Pop. (1890) corporate limits, 3,703; with suburbs 6,671; (1900) city only, 4,245.

OPELOUSAS, *ŏp-ė-lō'sas:* village, cap. St. Landry parish, La. It is on the Southern Pacific railroad, about 45 m. w. by n. of Baton Rouge, 160 m. from New Orleans. It has five churches, a convent and an acad.; and two weekly newspapers, one of which is printed in both English and French. It is in the midst of a productive agricultural region, and is an important point of shipment of cotton and rice. Pop. (1890) 1,572; (1900) 2,951.

OPEN, a. *ō′pn* [Ger. *offen;* Icel. *opinn;* AS. *yppe,* open. Ger. *öffnen;* Icel. *opna;* L. *aperīrĕ,* to open]: not shut or closed; expanded; not covered; clear; unobstructed; free to all; artless, frank; sincere; exposed to view; liable; not frosty, applied to the weather: V. to unlock; to unclose; to commence firing guns; to unfold; to break or split; to disclose; to explain or interpret; to begin; to bark, as dogs in hunting; to clear. OPENING, imp. *ō′pn-ĭng:* N. an aperture; a hole; a place admitting entrance; beginning; first appearance; opportunity, as a good *opening* presents itself. OPENED, pp. *ō′pnd.* OPENINGS, n. plu. *ō′pn-ĭngz,* piercings; holes; unfilled parts of a wall. OPENER, n. *ō′pn-ėr,* one who opens; that which opens. OPENLY, ad. *ō′pn-lĭ,* in public; not secretly. OPENNESS, n. *ō′pn-nĕs,* the quality or condition of being open; freedom from secrecy or obscurity; plainness; mildness, as applied to weather. OPEN-COAST, in *mining,* the method of working a vein when the ore appears at the outcrop, and can be obtained without sinking a deep shaft. OPEN-EYED, a. vigilant; watchful. OPEN-HANDED, a. liberal; generous. OPEN-HEARTED, a. frank; generous. OPEN-HEARTEDNESS, n. frankness; sincerity; generosity. OPEN-MOUTHED, a. greedy; clamorous. OPEN POLICY, in insurance, a policy in which the value of the subject insured has not been fixed, but has been left to be determined in case of loss, or because it has been left open to permit of the addition of other things whenever occasion demands. OPEN SAFETY VALVE, in a locomotive, as distinguished from a lock-up safety valve. OPENING-OUT, in mechanics, the enlarging of the diameter of a hole by means of a broach or reamer. OPENWORK, *ō′pn-wėrk,* in *fort.,* a work not protected at the gorge; in *mining,* work done in the open air, not underground. To OPEN UP, to lay open; to disclose; to discover (*up* may often well be omitted). OPENING OF THE TRENCHES, the commencement of the works of attack against a fortress, equivalent to the common expression 'breaking ground.' THE OPEN, the open country.—SYN. of 'open, a.': ingenuous; candid; unclouded; uncovered; unclosed; exposed; unprotected; apparent; plain; obvious; public; unreserved; evident; clear; undissembled; hearty; cordial; warm; attentive;—of 'open, v.': to unloose; show; discover; divide; break; explain; exhibit; interpret; reveal; commence.

OPEN-BILL (*Anastomus*): genus of birds of Heron family (*Ardeidæ*), natives of E. Indies and of Africa, remarkable for the structure of the bill, the mandibles being in contact only at the base and tip, with a wide interval between their edges in the middle. They frequent the sea-coast and rivers, and prey on fish.

OPEN CIRCUIT BATTERY, OPEN CIRCUIT CELL. See BATTERY, ELECTRIC.

OPEN-HEARTH FURNACE. See IRON; STEEL.

OPERA, n. *ŏp'ér-a* or *ŏp'ra* [F. *opéra*—from It. *opera*—from L. *opĕra*, work, labor] : a dramatic composition set to music, and sung and acted on the stage with instrumental accompaniments. OPERATIC, a. *ŏp'ĕ-răt'ĭk*, or OP'ERAT'ICAL, a. *-răt'ĭ-kăl*, pertaining to the opera. OP'ERAT'ICALLY, ad. *-lĭ*. OPERA-DANCER, a girl who dances in an opera or ballet; a ballet-girl, or a male dancer. OPERA-GLASS, a small teleseope, usually binocular, for viewing persons and objects more distinctly at any place of public amusement (see below). OPERA-HOUSE, a building in which operas are performed.—*Opera* is a musical drama, in which music forms an essential part, and not a mere accessory. As in the higher drama, poetry supersedes the prose of ordinary life, so in the O., with perhaps as great artistic right, the language of music is introduced at a considerable sacrifice of probability. The libretto or words are, in the modern O., a peg on which to hang the music, rather than the music an accessory to the written drama. The component parts of an O. are recitatives, duets, trios, quartets, choruses, and finales, accompanied throughout by an orchestra, and the whole is preceded by an instrumental Overture (q.v.). Recitative is declamation, which, in its succession of musical sounds and rhythm, strives to assimilate itself as much as possible to the accents of speech, and therefore does not entirely conform to musical rhythm. The accessories of scenic representation also are present, and a Ballet (q.v.) is frequently introduced. In some of the German operas, and in the French *opéra comique*, spoken dialogue without music takes the place of recitative. Among the varieties of the O. enumerated are the grand O., or *opera seria*, of dignified character; the romantic O., an admixture of the grave and lively; the comic O., or *opera buffa;* and many intermediate varieties.

The idea of the O. may have arisen partly from the Greek drama, which possessed, to a considerable extent, the operatic character: the choral parts were sung, and the dialogue was delivered in a sustained key, probably resembling operatic recitative more than ordinary speech. The earliest extant example of any composition resembling the lyric drama of the moderns is Adam de la Hale's comic O. of *Li gieus* (*le jeu*) *de Robin et de Marian*, composed in the 13th c., the music of which is wonderful for its date. The next appearance of anything like O. is in the 16th c., when various musical dramas were composed in the madrigalesque style. An opera composed by Zarlino is said to have been performed at Venice, when Henry III. passed through that city on his way from Poland to France. About the same time, a pastoral called *Dafne*, written by the poet Rinucci, was set to music by Peri; and the same poet and musician conjointly produced the lyric tragedy *La Morte di Euridice*, which was represented at the theatre of Florence 1600. Claudio Monteverde, one of a soc. of amateurs, known as the 'Florentine Academy,' who devoted themselves avowedly to the study and revival of Greek music, soon afterward produced his *Orfeo*, a 'favola di musica,' in whose performance an orchestra of no fewer

than 36 performers was called into requisition, most of the instruments being, however, used only in twos or threes, and never more than ten at a time. From these beginnings, the O., advanced into one of the permanent institutions of Italy—a development of music at first strongly opposed in character and style to the music of the church. With the progress of music, and the perfecting of the musical instruments comprised in the orchestra, the lyric drama began, toward the middle of the 18th c., to approach its present character. Of the innumerable Italian operas of the 18th c., only Cimarosa's *Matrimonio Segreto* retains its place on the stage. Cherubini, first of the more modern school, after producing *Quinto Fabio* at Milan, became naturalized in France: Rossini, who succeeded him in Italy, is the greatest name in the Italian opera. Nothing can exceed the deliciously fresh character of the best known operas of this truly great musician, *Il Barbiere di Siviglia, Otello, La Gazza Ladra, Semiramide,* and *Guillaume Tell.* Next to them rank the equally well-known works of Bellini, *Norma, La Sonnambula,* and *I Puritani; Lucia di Lammermoor, Lucrezia Borgia,* and *L'Elisir d'Amore,* the three *chefs-d'œuvre* of Donizetti, alone rivalling them in public estimation. A newer school of O. has recently sprung up in Italy, more grand though less fresh, of which the chief master is Verdi, whose *Ernani, Nabuchodonosor, I Lombardi, Otello, Rigoletto, Il Trovatore, La Traviata,* and others have attained immense popularity in Italy, and have held the stage wherever the Italian O. has been naturalized.

From Italy the O. was introduced into Germany, where, more scientific and less sensuous than in Italy, it flourished in opposition to national as well as ecclesiastical music. Germany divides with Italy the honor of perfecting orchestral music and the O. Glück, educated in Italy, produced his *Orfeo* in Vienna, and then went to Paris, where the French adopted him as the English adopted Handel. Mozart was the first composer of operas for the modern orchestra; *Idomeneo, Il Seraglio, Le Nozze di Figaro, Don Giovanni,* and *Zauberflöte* are his principal operatic works, unsurpassed by anything that has succeeded them. The most important German operas composed since their date are *Fidelio* by Beethoven; *Der Freischütz, Euryanthe,* and *Oberon* by Weber; *Faust* by Spohr; and the gorgeous operas of Meyerbeer, *Robert le Diable, Les Huguenots,* and *Le Prophète,* and *L'Étoile du Nord. Les Huguenots,* notwithstanding its involving enormous difficulties in representation, keeps its place in every operatic theatre in Europe, Richard Wagner (q.v.), chief exponent of a more recent school, generally known as that of the 'music of the future,' has by his *Tannhäuser, Lohengrin, Parsifal,* and other operas, introduced a new epoch in lyric drama, subordinating the instrumental music to the poetry, and dispensing with the set parts rigorously required in the old operas. The O. of the future, whether or not following Wagner's lead, will not escape a decided tinge from his influence. (See GLUCK: WAGNER, RICHARD: ETC.).

In France, the earliest operatic representation on record was in 1582. About 1669, the Abbot Perrin obtained from Louis XIV. the privilege of establishing an O. in the French language at Paris, and 1672 the privilege was transferred to Lulli, who may be considered the founder of the French lyrical drama. Lulli's popularity continued during a long period, and ended at the rise of the German Glück, who, naturalized in Paris, produced there his *Iphigènie in Aulide* and *Alceste*. It is greatly through Glück's influence that the modern French O. has become what it is, a composite work combining French, German, and Italian elements. Its best known productions include Méhul's *Joseph*, Halévy's *Juive*, Auber's, *Masaniello*, *Fra Diavolo*, and *Diamans de la Couronne*, and Gounod's *Faust*. *Polyeucte*, and *Tribut de Zamora*. The Italian O., introduced in Paris, 1646 by Cardinal Mazarin, and superseded 1670, was revived in the beginning of the 19th c., and has since flourished side by side with the national O. of France.

The possibility of a national English O. seems to have been shown first by Purcell, who, through Humphreys, had learned much from Lulli. His music to Dryden's *King Arthur* is very beautiful, though kept throughout subordinate to the business of the drama. *The Beggar's Opera*, as set to music by Dr. Pepusch, was a selection of the airs most popular at the time, It has retained its place on the stage, as has Dr. Arne's *Artaxerxes*, a translation from Metastasio adapted to music rich in melody. The importation of the Italian O. put a stop, for a time at least to the further development of an O. in England. In 1706, *Arsinoë*, with English words adapted to Italian airs, was performed at Drury Lane. In 1710, *Almahide*, wholly in Italian, was performed exclusively by Italian singers at the Haymarket Theatre; and a succession of attempts of the kind ended in the permanent establishment of the Italian opera. The arrival of Handel in England decided the future progress of the opera. That great master was during the greater part of his life an opera composer and opera manager. He composed for the London stage no fewer than 44 operas, now forgotten, German, Italian, and English. These were of course not the complex compositions of a later period, which could not have been performed in the then imperfect state of orchestral instruments. A recitative was set to music nearly as fast as the composer could put notes on paper, and the songs were accompanied in general by only one violin and bass, the composer sitting at the harpsichord, and supplying what was wanting. From Handel's time onward, the O. flourished as an exotic in Britain, the singers being foreign, and the works performed being either Italian or occasionally German or French. Attempts crowned with some measure of success have at times been made in England, to establish an O. of national character. Balfe's *Bohemian Girl* and *Rose of Castile* have, with other operas by Balfe, Wallace, and Macfarren, attained some popularity. Somewhat similar to the English hopes and efforts have been those in the United States to originate a national O. expressive of the

national spirit. No signs have appeared of any immediate success in this direction: the O. music of this country will probably long continue to be imported; but it is safe to predict that the importation will be of the best that the world of dramatic music can supply. See Hogarth's *Memoirs of the O.* (1851); S. Edward's *History of the O.* (1862); Grove's *Dictionary of Music.*

OPERA-GLASS: double telescope, used for looking at objects that require to be clearly seen rather than greatly magnified, such as adjoining scenery and buildings, the performers of a theatre or opera, etc. It is from its use at an opera that it derives its name. The O.-G. is short and light, and can be easily managed with one hand. Its small magnifying power (usually 2 to 3), and the large amount of light admitted by the ample object-glass, enable it to present a bright and pleasing picture, so that the eye is not strained to make out details, as in telescopes of greater power, which generally show a picture highly magnified but faint. It allows the use of both eyes, which gives the spectator the double advantage, not possessed by single telescopes, of not needing to keep one eye shut—an unnatural way of looking; and of seeing things stand out stereoscopically as in ordinary vision.

The O.-G. is the same in principle as the telescope invented by Galileo. It consists of two lenses, an object lens, and an eye-lens. The object-lens is convex, and the eye-lens concave. They are placed nearly at the distance of the difference of their focal lengths from one another. Fig. 1 represents the action of the telescope; *o* is the object-lens, and *e* the eye-lens, and *oe* is the axis of the instrument. The object-lens would form an image, *cab*, of the

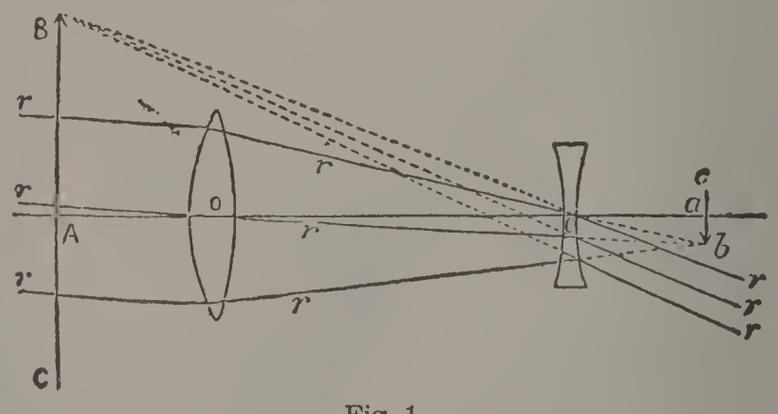


Fig. 1.

object looked at at or near its focus, but the eye-lens intervening, converts the light converging to *cab* to light diverging apparently from an object in front, CAB. To show more clearly the changes which the light undergoes, the course of a pencil of rays proceeding from the top of an object is traced. The ray proceeding from the top of the object to the centre of the lens, *o*, makes an angle, *ro*A, with the axis. This is the same as the angle *aob;* and either of these angles gives half the angle under which the object is seen to the unaided eye. The three extreme rays, *r*, *r*, *r*, of the pencil appear in the figure nearly parallel.

though they come from a point: the object is at a considerable distance from the object-glass or eye, so that it is not possible in so limited a figure to show their divergence. After passing through the object-lens, the three rays proceed to the point *b*, in the image which the object-lens would form at *cab*, if no eye-lens were there. This image, as shown in the figure, is inverted, and would be seen as such if the eye were placed about ten inches (the distance of distinct vision) behind it. The three rays in question do not reach the point *b* in consequence of the eye-lens intervening, and their course onward to that point, after passing the eye-lens, is shown by dotted lines. The actual course, after passing the second lens, is shown again by the full lines, *r*, *r*, *r*, which to the eye placed immediately behind the eye-lens appear to proceed from the point B in front. As the light comes from B in the same direction as it comes from the actual point in the object, the image is erect. What holds for the point B, holds for every point in the image and object. To find the magnifying power, it is necessary to join B*e* and C*e*, and produce the lines thus formed to *b* and *c*. As the eye is placed immediately behind the eye-lens, the angle under which the magnified object is seen is the angle B*e*C, which is equal to *ceb*. Now, the angle under which the object itself is seen at *o* or at *e* —for the slight difference has no effect at the distance at which objects require to be seen by a telescope—is twice the Angle *ro*A, or which is the same thing, the angle *cob*. The ratio of the angle *ceb* to the angle *cob*, which is the magnifying power, is easily seen to be the same as that of the line *oa* to the line *ae*. But *oa* is the focal length of the object-glass, and *ae* is the focal length of the eye-glass, so that the magnifying power of the instrument is the number of times the focal length of the eye-glass is contained in that of the object-glass. The longer, therefore, the focal length of the object-lens, or the shorter the focal length of the eye-lens, the greater the magnifying power. This may be practically expressed thus: the flatter the object-lens, and the hollower the eye-lens, the more are objects magnified by the glass. The magnifying power may be found with sufficient accuracy by looking at an object with one eye through the tube and the other eye unaided, and so handling the glass that the magnified image seen by the one eye is superposed on the object seen by the naked eye, when a comparison of their relative sizes can be easily made. For great magnification, the instrument requires to be greatly lengthened—a condition inconsistent with its use as an opera-glass. In addition, a high magnifying power is attended with the disadvantage that the field of view, or amount of object or objects seen, becomes too limited. On screwing out the instrument, it will be seen that objects increase in size as the instrument is lengthened, but that the picture becomes more and more limited, showing that a large power and a large field are incompatible. The O.-G. need not be set to the same precise point as is necessary with ordinary terrestrial telescopes, as the lengthening or shortening of the instrument

does not produce so decided an effect on the divergence of the light; the change of divergence, caused by screwing the O.-G. out or in, is so slight as not much to overstep the power of adjustment of the eye, so that an object does not lose all its distinctness at any point within the range of the instrument. There is, however, a particular point at which an object at a certain distance is best seen.

Fig. 2 gives a section of the O.-G. The two telescopes are identical in construction, and are placed parallel. The

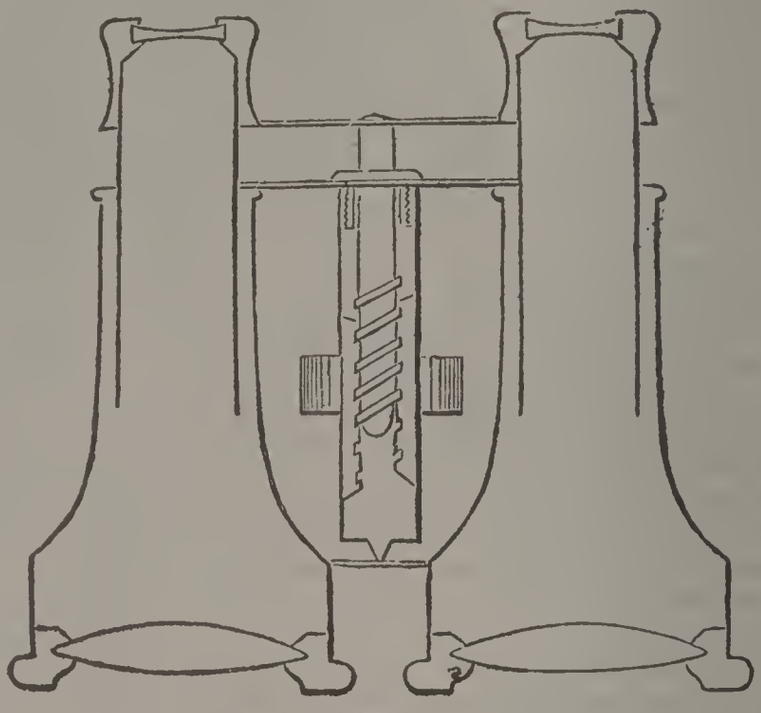


Fig. 2.

blending of the two images is easily effected by the eyes, as in ordinary vision. Paris has nearly a monopoly of the manufacture of opera-glasses. The cheapest consist of single lenses; those of the better class have compound achromatic lens. A usual construction for a medium price is to have an achromatic object-lens, consisting of two lenses and a single eye-lens. In the finest class of opera-glasses, called *field-glasses*, both eye-lenses and object-lenses are achromatic. Plössl's celebrated field-glasses (Ger. *Feldstecher*) have 12 lenses, each object-lens and eye-lens being composed of three separate lenses.

OP'ERA-HAT, n.: a folding hat of felt, silk, or fur.

OPERAMETER, n. *ŏp'ĕr-ăm'ĕ-tĕr* [L. *opĕra*, work; Gr. *metron*, measure]: an instrument which indicates the number of revolutions made by a wheel or shaft; a machine for measuring work done, as of cloth.

OPERANT, a. *ŏp'ĕr-ănt* [L. *op'erans* or *operan'tem*, working—from *opus*, work]: in *OE.*, having power to produce any effect. OPERANCY, n. *ŏp'ĕr-ansĭ*: the act or state of operating; operation.

OPERATE, v. *ŏp'ĕr-āt* [L. *operātus*, worked, labored—from *opus* and *opera*, work: It. *operare: F. opérer*]: to exert power or strength, either physical or mechanical; to produce any effect; to produce by agency; to cut or open a part of the body with curative intent. OP'ERATING, imp. OP'ERATED, pp. OP'ERATOR, n. *-ā-tėr*, one who operates; in *surg.*, the skilled person who does some remedial act upon the human body by cutting with an instrument, or otherwise. OP'ERA'TION, n. *-ā'shŭn* [F.—L.]: the act or process of operating; something to be done; agency; process; influence; action; effect; in *surg.*, any action done by a qualified person upon the human body, with the hand or by means of an instrument, with a vie · to heal or bring to a normal state. OP'ERA'TIONS, n. plu. *-shŭnz*, movements, as of an army. OP'ERATIVE, n. *-tĭv*, a skilled workman: ADJ. having the power of acting; exerting force; effective.

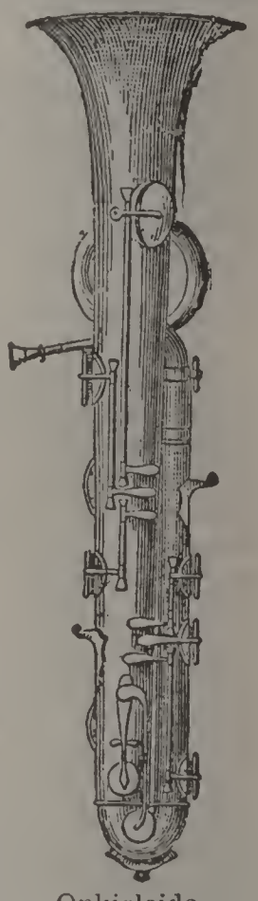
OPERATIONS, CALCULUS OF. See GROUPS.

OPERCULAR, a. *ō-pėr'kū-lėr* [L. *oper'culum*, a lid or cover—from *operĭō*, I cover over]: having a lid or cover; of the nature of a lid or cover. OPER'CULATE, a. *-lāt*, or OPER'CULA'TED, a. *-lā'tĕd*, in *bot.*, having a lid or cover, as a capsule; opening by a lid. OPER'CULUM, n. *-kū-lŭm*, OPER'CULA, plu. *-kū-lă*, in *bot.*, a cap, lid, or cover; the lid or covering of the mouth of the urn or capsule (*theca*) which contains the spores of mosses. Before the ripening of the spores, the operculum is generally concealed by the *calyptra;* but after the calyptra has been thrown off, the operculum itself also generally falls off, leaving the peristome visible, and the mouth of the urn open. In some cases the operculum does not fall off, and the urn opens by valves. In *conch.*, operculum is the lid or covering with which certain mollusks, e.g., the periwinkle, close the aperture of their shells when they withdraw within them. It is attached to the back of the foot of the mollusk. In some it is calcareous, forming a shelly plate; in some it is horny; while gasteropods very nearly allied to those which possess it, are destitute of it altogether. The operculum increases in various ways, so as to present in different genera great diversity of structure, concentric, spiral, unguiculate, etc. In *ichth.*, operculum is the gill-cover, or bony flap covering and protecting the gills in fishes. OPER'CULA'TA, n. plu. those gasteropods whose shell is closed by an operculum or horny valve. OPERCULIFORM, a. *ō'pėr-kū'lĭ-fawrm* [L. *forma*, shape]: formed as a lid or cover.

OPERETTA, n. *ŏp-ėr-ĕt'ta* [It., dim. of *opera*]: in *mus.*, a short opera, or musical drama of a light character.

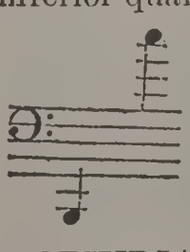
OPEROSE, a. *ŏp'ĕr-ōs* [L. *operōsus*, industrious, laborious—from *opĕrā*, work, labor: It. *operoso*]: attended with much labor; tedious. OP'EROSELY, ad. *-lĭ*. OP'EROSENESS, n. *nĕs*, the state of being laborious.

OPHICEPHALUS, *ŏf-ĭ-sĕf'a-lŭs:* genus of fishes, of family *Anabasidæ* (q.v.), sometimes regarded as constituting a distinct family *Ophicephalidæ*, because there is a mere cavity for retaining water to supply the gills, and no pharyngeal laminæ, and because of the long eel-like form and the flattened head covered with large scales. Some of them are common in fresh waters of the E. Indies, are often found among wet grass, often travel from one pool to another, and are capable of subsisting for a long time in half-dried mud, descending into it when the pools dry up. The CORA-MOTA or GACHUA of India (*O. gachua*) is much used for food by the natives, though generally rejected by Europeans on account of its very snake-like appearance. It is very tenacious of life, and is not only brought to the Indian markets alive, but is cut to pieces while still living for the convenience of buyers.



Ophicleide.

OPHICLEIDE, n. *ŏf'ĭ-klīd* [Gr. *ophis*, a serpent; *kleis* or *kleida*, a key: F. *ophicléide*]: largest keyed musical wind-instrument of brass or copper, invented to supersede the Serpent (q.v.) in the orchestra and military bands. It consists of a conical tube, terminating in a bell like that of the horn, with a mouth-piece similar to that of the serpent, and ten ventages or holes, all stopped by keys like those of the bassoon, but of larger size. Ophicleides are of two kinds, the bass and the alto. The bass O. offers great resources for maintaining the low part of masses of harmony. Music for it is written in the bass clef, and the compass of the instrument is from B, the third space below the bass staff, to C, the fifth added space above it, including all the intervening chromatic intervals. The alto O. is an instrument of much inferior quality, and less used. Its compass also is three octaves and one note. The music for it is written in the treble cleff, and an octave higher than it is played. Double bass or monster ophicleides have sometimes been used in large orchestras, but the amount of breath required to play them has prevented their coming into general use.



OPHIDIAN, a. *ŏf-ĭd'ĭ-ăn* [Gr. *ophĭdĭŏn*, a small serpent—from *ophis*, a serpent]: belonging to the serpent order of reptiles, called OPHID'IA, n. plu., or OPHID'IANS, n. plu. *-ănz* (see SERPENTS). OPHID'ION, n. *-ŏn*, an eel-shaped fish, found in the Mediterranean. OPHID'IOUS, a. *-ŭs* snake-like.

OPHIOBATRACHIA, n. plu. *ŏf'ĭ-ō-băt-răk'ĭ-ă* [Gr *ophis*, a serpent—gen. *ophios; batrăchos*, a frog]: applied sometimes to the order of snake-like Amphibians, as the *Cæciliæ*.

OPHIOGLOSSEÆ, *ŏf-ĭ-o-glŏs'ē-ē:* suborder of *Filices* or Ferns (q.v.), consisting of a few rather elegant little plants with an erect or pendulous stem, which has a cavity instead of pith, leaves with netted veins, and the spore-cases (*thecæ*) collected into a spike formed at the edges of an altered leaf, 2-valved, and without trace of an elastic ring. They are found in warm and temperate countries, but abound most in the islands of tropical Asia. Several species are European. The Common Adder's-tongue (*Ophioglossum vulgatum*), was formerly supposed to have magical virtues, and was used also as a vulnerary, though it seems to possess only a mucilaginous quality.

Adder's-Tongue (*Ophioglossum vulgatum*).

OPHIOLOGY, n. *ŏf'ĭ-ŏl'ŏ-jĭ* [Gr. *ophis*, a serpent; *logos*, discourse]: that branch of natural history which treats of serpents. OPHIOLOGIC, a. *ŏf'ĭ-ŏ-lŏj'ĭk*, or OPH'IOLOG'ICAL, a. *-ĭ-kăl*, pertaining to. OPH'IOL'OGIST, n. *-jĭst*, one versed in the natural history of serpents.

OPHIOMANCY, n. *ŏf'ĭ-ŏ-măn'sĭ* [Gr. *ophis*, a serpent; *manteï'a*, divination]: divination by serpents.

OPHIOMORPHA, n. plu. *ŏf'ĭ-ō-mŏr'fă* [Gr. *ophis*, a serpent; *morphē*, shape]: the order of Amphibia which includes the *Cæciliæ*. OPHIOMOR'PHOUS, a. *-mŏr'fŭs*, having the form of a serpent; snake-shaped.

OPHIOPHAGOUS, a. *ŏf'ĭ-ŏf'ă-gŭs* [Gr. *ophis*, a serpent; *phagein*, to eat]: eating or feeding on serpents.

O'PHIR, *ō'fẽr:* region frequently mentioned in the Old Test., and from which the ships of Solomon, fitted out in the harbors of Edom, brought gold, precious stones, sandal-wood, etc. The voyage occupied three years. Where Ophir was situated, has been a disputed question. It was probably in one of these three countries: on the east coast of Africa about Sofala, or in Arabia, or in India. Huet, Bruce (the traveller), the historian Robertson, M. Quatremère, etc., are in favor of Africa; Michaelis, Niebühr (the traveller), Gosellin, Vincent, Winer, Fürst, Knobel, Forster, Crawfurd, and Kalisch, of Arabia; Vitringa, Reland, Lassen, Ritter, Bertheau, and Ewald, of India. Josephus, however, it should be said, placed O. in the peninsula of Malacca, and his very respectable opinion has been adopted by Sir J. Emerson Tennent in his work

on Ceylon. For a complete discussion of the point, see Karl Ritter's *Erdkunde* (vol. xiv. 1848), 80 octavo pages of which are devoted to Ophir. According to Ritter, who accepts the view of Lassen, O. was situated at the mouth of the Indus. To each of the three sites there are some objections; but s.e. Arabia probably presents the fewest; and that region certainly had for its inhabitants in ancient times the descendants of the son of Joktan who was named Ophir (see Gen. x. 29).

O'PHIR, called by the Malays, *Gunong Pasaman:* volcanic mountain in the highlands of Padang, island of Sumatra, 0° 4′ 58″ n. lat., and 99° 55′ e. long. The e. peak, Telaman, is 9,939 ft. above the sea; the w. peak is called Pasaman. The numerous inhabitants have cleared off forest and brought under cultivation large tracts of land on the slopes of O., and its base is studded with villages. The O. districts are most beautiful, and the lofty waterfalls, contrasting with the bright-green foliage of the mountain, highly picturesque.

OPHISU'RUS: see SNAKE-EEL.

OPHITE, n. *ō'fīt,* or OPHIOLITE, n. *ŏf-ī'ŏ-līt* [Gr. *ophis,* a serpent; *lithos,* a stone]: green porphyry or serpentine.

OPHITES, n. plu. *ō'fīts* [Gr. *ophitai,* serpent-brethren, from *ophis,* serpent]: sect of Gnostics (q.v.) in the 2d c., who while they shared the general belief of dualism, the conflict of matter and spirit, the emanations, the Demiurgos, and other notions common to the many subdivisions of that extraordinary school, were distinguished from all by their peculiar doctrine and worship connected with their *ophis* or serpent. The O., like most other Gnostics, regarded the Demiurgos, or the Jehovah of the Old Testament, with great abhorrence, but they pursued this notion into a very curious development. Regarding the emancipation of man from the power and control of the Demiurgos as a most important end, they considered the serpent who tempted Eve, and introduced into the world 'knowledge' and revolt against Jehovah, to have been the great benefactor of the human race. Hence their worship of the serpent as the Savior and the Christ. They attempted to engraft 'Ophism' on Christianity, and sought to impart to the Christian Eucharist an Ophite character, by causing the bread designed for the Eucharistic sacrifice *to be licked by a serpent,* which was kept in a cave for the purpose, and which the communicants kissed after receiving the Eucharist (*Epiph. Hor.* 37, s. 5). Our information, however, regarding them is very meagre, and comes chiefly from antagonistic sources. The O. originated in Egypt, probably from some relation to the Egyptian serpent-worship, and spread thence into Syria and Asia Minor. Offshoots of this sect are the Cainites: see CAIN: SETHITES.

OPHIUCHUS, n. *ŏf'ĭ-ū'kŭs* [Gr. *ophis,* a serpent; *echein,* to hold]: the serpent-bearer, one of the northern constellations, represented by a man holding a serpent.

OPHIUROIDEA, n. plu. *ŏf'ĭ-ū-roy'dē-ă* [Gr. *ophis,* a snake; *oura,* a tail; *eidos,* appearance]: the Brittle Starfishes (q.v.), a class of *Echinodermata* (q.v.): see also ZOOLOGY.

OPHTHALMIA, n. *ŏf-thăl'mĭ-ă*, or OPHTHAL'MY, n. *-mĭ* [Gr. *ophthalmos*, the eye]: inflammation of the eye. OPHTHAL'MIC, a. *-mĭk*, pertaining to the eye. OPHTHAL'MODYN'IA, n. *-dĭn'ĭ-ă* [Gr. *odunē*, pain], violent pain in the eye. See EYE, DISEASES OF THE.

OPHTHALMOLOGY, n. *ŏf'thăl-mŏl'ŏ-jĭ* [Gr. *ophthalmos*, the eye; *logos*, discourse]: science which deals with the anatomy and functions of the eye. OPH'THALMOL'OGIST, n. *-jĭst*, one skilled in ophthalmology.—See EYE: EYE, DISEASES OF THE: OPHTHALMIA.

OPHTHALMOMETER, n. *ŏf-thăl-mŏm'ĕ-tėr* [prefix *ophthalmo-*; Eng. *meter*]: in *surg.*, an instrument of the nature of compasses for measuring the capacity of the chambers of the eye in anatomical experiments: in *optics*, an instrument for ascertaining the defects in curvature of the refracting surfaces of the eye; used to measure the degree of astigmatism.

OPHTHALMOPTOSIS, n. *ŏf'thăl-mŏp'tō-sĭs* [Gr. *ophthalmos*, the eye; *ptōsis*, fall; ruin]: protrusion of the whole eyeball.

OPHTHALMOSCOPE, n. *ŏf-thăl'mŏ-skōp* [Gr. *ophthalmos*, the eye; *skopĕō*, I view]: an instrument for examining the interior of the living eye. OPHTHALMOSCOPY, n. *ŏf-thăl-mŏs'kŏ-pĭ*, the pretended art of knowing a person's temper and manner from the appearance of the eye; examination of the fundus of the eye by means of the ophthalmoscope.—The *Ophthalmoscope*, by which the interior of the eye can be examined, was invented 1851 by Prof. Helmholtz, who showed that by illuminating and examining an eye in the same direction, its deeper parts can be rendered visible. All forms of O. are adaptations of this principle. The form now generally in use consists of a concave mirror of about 10 inches focus, 1 to 3 inches in diameter, with a small hole in the centre; and certain lenses to use with it. Examination is facilitated by dilating the pupil of the observed eye with atropine or homatropine; and for a complete examination, this is indispensable. The person whose eye is to be examined is seated in a darkened room, with a bright light, on a level with his eye by the side of his head. The observer sits opposite him, and placing the mirror close to his own eye, and about 18 inches from the eye to be examined, reflects the light upon the latter, while he looks at it through the hole. The pupil in a healthy eye appears of a bright red or orange instead of its usual deep black. In the *direct method*, the observing eye must be placed as close to the observed as the intervention of the mirror will allow, when an image of a smaller part of the fundus is seen, but erect and magnified about 14 diameters. The fundus appears of an orange or red color, varying much in different individuals. The blood-vessels of the retina are seen as darker red lines coursing over it. The entrance of the optic nerve, commonly called the *disk*, from which these vessels diverge, appears as a round disk of a much paler color.

OPIATE, n. *ō′pĭ-āt* [F. *opiat*, an opiate—from L. *opĭŭm*, the juice of the poppy]: any preparation or medicine which contains opium: Adj. inducing sleep; causing rest; narcotic. O′PIATED, a. *-ā-tĕd*, mixed with opium.

OPIE, *ō′pĭ*, Amelia (Alderson): 1769-1853; b. Norwich, England; daughter of a physician. While very young, she wrote songs and tragedies. She was married to Opie 1798. In 1801 her first novel, *Father and Daughter*, appeared; next year a volume of graceful poems. *Adeline Mowbray* and *Simple Tales* were her next works. On her husband's death she returned to Norwich, and published a memoir of him, prefixed to his lectures; also *Temper*, *Tales of Real Life*, *Valentine's Eve*, *Tales of the Heart*, and *Madeline*. She became a Quaker 1825, and afterward published little except a volume entitled *Detraction Displayed*, and articles in religious periodicals.

O′PIE, John, R.A.: English historical and portrait painter: 1761, May—1807, Apr. 9; b. at St. Agnes, seven m. from Truro, Cornwall. His father, a master-carpenter, wished him to follow the same trade, but his bias for art was strong; and his attempts at portrait-painting secured the friendly help of Dr. Wolcot ('Peter Pindar'), who 1780, took him to London and proclaimed him as the 'Cornish Wonder,' a self-taught genius. Opie soon attracted the world of fashion, but this tide of fortune soon ebbed, and he took up historical or scriptural subjects, executed on a large scale. His pencil was employed by Boydell in his well-meant and magnificent scheme to elevate British art; he painted also a number of works in the illustration of *Bowyer's English History*, *Macklin's Poets and Biblical Gallery*, and similar undertakings. His pictures of the *Murder of James I. of Scotland*, the *Slaughter of Rizzio*, *Jephtha's Vow*, *Presentation in the Temple*, *Arthur and Hubert*, *Belisarius and Juliet in the Garden*, are his most noted works. Opie was elected an associate of the Royal Acad. 1786, and academician 1787. He devoted part of his time to literary efforts in illustration of art: these were chiefly the *Life of Reynolds* in Dr. Wolcot's ed. of Pilkington's *Dictionary of Painters;* and lectures on art, at the Royal Institution. Appointed prof. of painting, he delivered four lectures in that capacity. Opie was twice married. He obtained a divorce from his first wife: his second, well known as one of the most popular novelists of the day, appreciated his character, which she depicted in a memorial vol. after his death. (See Opie, Amelia.) He died in London, and was buried in the crypt of St. Paul's.

OPINE, v. *ō-pīn′* [F. *opiner*, to give one's opinion—from L. *opināri*, to esteem or believe]: to think; to suppose; to be of opinion. Opi′ning, imp. Opined, pp. *ō-pīnd′*.

OPINICUS, *ō-pĭ′nĭ-kŭs:* one of the fabulous creatures known in heraldry, with head and neck of an eagle, body of a lion, wings, and a short tail like that of a camel.

OPINION, n. *ŏ-pĭn'yŭn* [F. *opinion*—from L. *opinĭōnem*, belief, judgment: It. *opinione*]: settled judgment or belief of the mind; sentiment; judgment: without absolute certainty, founded on the evidence given; notion: in OE., reputation. OPIN'IONATED, a. *-ā-tĕd*, unduly attached to one's own opinions: egotistical; conceited. OPIN'IONATIVE, a. *-tĭv*, fond of preconceived notions. OPIN'IONATIVELY, ad. *-tĭv-lĭ*. OPIN'IONA'TIVENESS, n. *-nĕs*, excessive attachment to one's own opinions. OPIN'IONED, a. *yŭnd*, attached to particular opinions; conceited. OPIN'IONIST, n. *-yŭn-ĭst*, one doggedly attached to his own notions.—SYN. of 'opinion': idea; view; persuasion; estimation.

OPISTHOCŒLIAN, a. *ō-pĭs'thō-sē'lĭ-ăn* [Gr. *opisthĕ*, behind, backward: *koilos*, hollow]: having the vertebræ hollow at the back part.

OPISTHOGLYPH'A: one of the two groups, the other being *Proteroglypha*, into which venomous serpents (q.v.) are divided according to the anterior or posterior position respectively of the poison-conducting teeth. The snakes of the first group are included in the family *Colubridæ* and are represented by the neotropical tree-snakes (*Dipsas*), the European cat-snake, and the Oriental *Homalopsinæ*. In their case one or a few of the posterior maxillary teeth have a groove or furrow in front, which conducts the secretion of the enlarged upper labial glands into the wound. These opisthoglyphs comprise about 300 species and are of considerable morphological interest, since they connect the *Colubridæ* with the *Viperidæ*, the characteristic (proteroglyph) poisonous apparatus of which seems to have been derived from that of the *Opisthoglypha* by the reduction or shortening of the anterior portion of the maxillaries and the harmless teeth so that the posterior or poison fangs come to the front. The *Proteroglypha*, then, are those serpents, such as the cobras and coral-snakes (*Elapinæ*), sea-snakes (*Hydrophinæ*), vipers and rattlesnakes, whose poison fangs are in the front part of the mouth.

OPISTHOTONOS, n. *ō'pĭs-thŏt'ŏ-nŏs* [Gr. *opisthĕ*, backward; *tonos*, a straining—from *teinō*, I stretch]: spasms by which the whole body is bent backward and stiffened.

OPITZ, *ō'pĭts*, MARTIN: German poet: 1597, Dec. 23—1639, Aug. 20; b. Bunzlau, Silesia. He received an education of the highest kind; and after some time at the court of the Duke of Liegnitz, he accepted, 1622, an invitation by Bethlen Gabor, Prince of Transylvania, to teach philosophy and the *humaniora* at Weissenburg; but disliking the rudeness of the country, he soon returned to the court of the Duke of Liegnitz. In 1624 his first poems were published, and in the same year his work *Von der deutschen Poeterei*, in which he laid the foundation of a system of German poetics. In 1625 he went to Vienna, where, on account of an elegy on the death of an archduke, he received a laurel crown from the hands of

emperor Ferdinand II. In 1626, he became secretary, though a Protestant, to the Burggraf Karl Hannibal of Dohna, a distinguished Rom. Catholic and imperialist, and was employed in various transactions with foreign courts. In 1629, the emperor raised him to the rank of nobility. After the death of the Burggraf of Dohna, 1633, he returned to the courts of Liegnitz and Brieg. About this time he published *Vesuv*, a didactic poem, and his *Trostgedicht in Widerwärtigkeit des Kriegs*, the best of his poems, which were followed by an opera called *Judith*, a translation of the *Antigone* of Sophocles, and a translation of the Psalms. In 1638, he was appointed secretary and historiographer to Ladislaus IV. of Poland. But in the midst of his days, and when he had attained to fame and prosperity, he was cut off by the plague at Danzig. Opitz was more honored by his contemporaries than almost any other poet ever was. German poetry, which had been neglected and despised, began again to be esteemed and cultivated. The popularity of Opitz, and his relations with the chiefs of the Rom. Cath. party, led to the adoption, throughout the whole of Germany, of the form given to the German language by Luther, which had previously obtained general acceptance only in the Prot. states. His poetry is characterized by careful attention to language and metre, and by reflection rather than by brilliant fancy or deep feeling. There are several editions of his works, but none complete (3 vols. Breslau 1690; 3 vols. Amst. 1646; and 3 vols. Frankfurt and Leipzig 1724).

OPIUM, n. *ō′pĭ-ŭm* [L. *opĭum;* Gr. *opĭon*, the juice of the poppy: It. *opio:* F. *opium*]: one of the most valuable of medicines; the dried juice of the unripe capsules of a species of Poppy (q.v.), *Papaver somniferum*, sometimes called the Common Poppy, and sometimes the White Poppy, though the latter name is really appropriate to only one of its varieties. The plant is a native probably of some warmer parts of Asia, though it is now common in cultivated and waste grounds throughout all s. and middle Europe, and is found occasionally in Britain. It is an annual, varying in height from one to six ft., erect, branched, of glaucous green color, with ovate-oblong sessile leaves, stem and leaves generally smooth, the branches terminated by large flowers on long stalks, the capsules globose or roundish-ovate and smooth. There are two principal varieties cultivated for the opium that they yield, which have been regarded by some botanists as distinct species; the one (*Papaver somniferum*) having generally red or violet-colored flowers, numerous flower-stalks rising together, globose capsules opening by a circle of pores under the persistent stigma, and black seeds; the other (*P. officinale*) having white flowers, solitary flower-stalks, capsules somewhat ovate, the circle of pores almost wanting, seeds white. The former variety is generally cultivated in the mountainous parts of n. India, the latter in the plain of Bengal, where the poppy-

fields are described as resembling green lakes studded with white water-lilies. The cultivation of the poppy for opium is carried on in many parts of India, though the chief opium district is a large tract on the Ganges, about 600 m. long and 200 m. broad, which was divided by the E. India Co. into two *agencies*, that of Behar and that of Benares, the central factory of the former being at Patna, and of the latter at Ghazeepore. The poppy is extensively cultivated for opium also in the Asiatic provinces of Turkey, in Egypt, and in Persia. Opium of very good quality is produced, though not in large amount, in parts of Europe, and even in Britain. It is sometimes alleged that a much warmer climate than that of Britain is requisite for its profitable production, but the chief fault of the climate seems rather the frequency of wet weather. Very fine specimens have been produced, and the produce per acre has been found amply remunerative; but a great difficulty is experienced in obtaining labor at a moderate rate for a few days only at a time, and when the experiment is conducted on a small scale, only for a few hours daily. This difficulty was felt in an experiment, otherwise most successful, at Edinburgh, by Mr. Young, a surgeon, who about 1830 obtained 56 lbs. of O. from one acre of poppies, and sold it at 36s. a lb. It was of excellent quality. His mode of cultivation was similar to that usual in India. The seed being sown in spring on a rich soil, the plants were kept clear of weeds, and when they had flowered and produced capsules, incisions were made in the capsules, and the exuded juice collected as described below. The capsules vary from the size of a hen's egg to that of the fist. In India, the poppy flowers in the end of Jan. and beginning of Feb.

Mr. Alexander McDonald, minister resident at Teheran, Persia, in 1895 prepared a report upon the cultivation of the poppy and the preparation of opium in Persia, to meet some inquiries from the southern United States. He considers that the climatic conditions of the Gulf States would be favorable. Following is the report in part:

'The opium poppy is by no means difficult to cultivate, but to bring it to a state of maturity to produce opium requires very considerable knowledge and unremitting care and attention. All Persian opium is cultivated on irrigated land; consequently the moisture is practically under the farmers' control. This is most important, as rain, when the plant is nearly at maturity, would be certain to destroy the opium elements. The quantity of moisture has to be most carefully regulated, except in the winter, when the plant is in a kind of quiescent state and independent of external influences. The great difficulty which meets the amateur grower is to know the exact time when the plant arrives at maturity, for without this knowledge all his efforts will be frustrated and his outlay dissipated. All the plants on a plot will not mature at the same time, but each one has to be examined separately. If the incision for extracting the

opium is made too early in the plant, nothing but a white sap will exude, and if too late the juice will have dried up.

'Land intended for the opium crop should be plowed up in July to free it as much as possible from weeds before sowing the seed. On irrigated lands the whole surface must be laid out in terraces, larger or smaller as the land is flat or hilly, and each one must be surrounded by a small bank, say six inches high, so as to preserve a smooth and level surface in order that the water may be turned on to an even depth. It is doubtful whether rain-watered land could be depended upon for the regular supply of moisture.

'The seed is sown broadcast, in September and October, on a level surface and not on ridges. Previously to the sowing, the ground is cleared of stones and rubbish, as the plant can easily be obstructed in its growth. When the seed is sown, the water is turned on and the ground is allowed to remain without any further operation for two or three days, until the water has become absorbed and the outer surface has had time to dry a little. The ground is then raked over so as to make a complete covering for the seed. If there should be no rainfall within a fortnight, the water is again turned on, and this is repeated at irregular intervals until the winter rains render it unnecessary. After the sowing and before the next watering most cultivators sprinkle manure all over the terraces. Almost any kind impregnated with strong alkaloids will do.

'In about six weeks from the time of sowing, the plants will have shot forth four or five leaves. They should then be thinned out so as to stand about six inches apart in all directions. The plants are hardy and will stand the cold up to freezing point. During the winter no irrigation is needed; but from the end of March the plants will have become vigorous and should have water, either by rain or irrigation, at least every seven to ten days. Again about this time manure is spread between the plants in order to keep them strong and stimulate the sap. It is necessary when the spring growth begins to observe carefully the state of the plant and not give it too much water or it will grow out of all proportion and be utterly useless. The flowers will appear in May and will continue for about a fortnight. After the flowers begin to droop and until the opium matures is the most critical time, and a close observation of the plant has to be made so that a healthy condition may be maintained. A slight watering may be necessary, but the state of the plant must be the determining factor. For some few days before the plant matures no water should be given.

'When the flower has fallen, the boll immediately below must be very carefully noted. When it assumes a light brown color, darker than amber, it may be assumed that the poppy has matured. An incision diagonally across the boll from top to bottom should be made, and if the juice, of a dark-brown color, exudes, it is certain that

the opium is matured. The incision should be made in the evening and the opium which adheres to the stem of the plant should be removed before sunrise in the morning. In this country (Persia) the opium is collected into jars or ordinary cooking utensils and stored up at the cultivator's house until the harvest is finished. It must be carefully borne in mind that each plant must be examined before the incision is made for there is a difference in time in the maturing of the plants—about the end of May or the beginning of June.

'The preparation of the drug for the market is usually undertaken by the merchant and but rarely by the cultivators. This is a business quite distinct and requires a building and utensils generally beyond the reach of the producer. When the opium reaches the merchant it contains a good deal of foreign matter, especially pieces of the stem of the plant, to which the opium adheres. These have to be removed and then the opium undergoes a process of kneading and pressing, so as to get rid of the superfluous water. A little linseed oil is used in the process and some kinds are largely diluted with it.

'It would appear that if the cultivation of opium were taken in hand seriously, two skilled persons—one the cultivator and the other a kneader—should be engaged to undertake the growing and the preparation for the market. Without these, it is to be feared the enterprise would be a failure.'

Opium, as a commercial article, is of great importance, exceeding indeed that of any other drug in use, and the cultivation of the opium poppy (*Papaver somniferum*) in British India is an extensive branch of agriculture, and the collection and preparation of the drug itself employs a large number of persons in the Patna, Malwa, and Benares districts of Bengal. Indeed during the whole existence of the E. India Company, the production of this drug was of the first importance; its employment as a habitual narcotic, as well as a medicine among all the eastern nations, demands an enormous supply. The seed is sown in India in the beginning of Nov.; it flowers in the end of Jan., or a little later; and in three or four weeks after, the capsules or poppy-heads are about the size of hens' eggs, and are ready for operating upon. When this is the case, the collectors each take a little iron instrument, called a *nushtur* (made of three or four small plates of iron, narrow at one end and wider at the other, which is also notched like a saw) with which they wound each full-grown poppy head as they make their way through the plants in the field. This is always done early in the morning, before the heat of the sun is felt; during the day the milky juice of the plant oozes out, and early on the following morning it is collected by scraping it off with a kind of scoop, called a *sittooha*, and transferred to an earthen vessel, called a *kurrace*, hanging at the side of the collector. When this is full, it is carried home and transferred to a shallow open brass dish, called a *thallee*, and left for a time tilted on

its side, so that any watery fluid may drain out; this watery fluid is called *pusseewah*, and is very detrimental to the opium unless removed. It now requires daily attendance, and has to be turned frequently, so that the air may dry it equally, until it acquires a moderate consistency, which requires three or four weeks; it is then packed in small earthen jars, and taken to the *godowns* or factories; here the contents of each jar are turned out and carefully weighed, tested, valued, and credited to the cultivator. The opium is then thrown in vast vats, which hold the accumulations of whole districts, and the mass being kneaded, is again taken out and made into balls or cakes for the market.

This is a very important operation, and is conducted in long rooms, the workmen sitting in rows, closely watched by the overseers to insure careful work. Before each workman is a tray, and within easy reach is placed the *tagar*, a tin vessel for holding as much opium as will make three or five balls. On the tray is another basin containing water, and a smaller tray; on this tray stands a brass cup, into which the ball or cake is molded, also a supply of thin layers of poppy petals, formed by laying them out overlapping each other, and pressing them upon one another; these are prepared by women in the poppy-fields, and with these is a cup filled with a sticky fluid called *lewah*, made from opium of inferior quality. The operator begins his work by taking the brass cup and placing on its bottom one of the cakes of poppy petals, which he smears over with the *lewah;* then adds other cakes of petals to overlap and adhere to the first, until the cup is lined and a coat of petals is thus formed for the opium, of which he takes the exact quantity as near as he can guess, works it into a ball, and places it in the basin, so that the lining of petals incloses it and sticks to it, in consequence of the *lewah* smeared on the inner side of the thin cakes of petals. Other petals are put on the upper part of the ball, and the whole gathered round it, forming a case about as thick as a bank-note. Each man's work for the day is kept by itself, and after having been duly registered, is taken to a vast drying-room, where the balls are placed in tiers on lattice-work racks, and are continually turned and examined by boys, to keep them from insects and other injuries. After being fully dried, these balls are packed in chests for the market. The manufacture of opium is carried on to the greatest extent in India, but large quantities are made also in Turkey, and the latter is considered the best in quality. It is made also at Trebizond in Persia, and in Egypt; occasionally it has been produced in Germany, France, and England. Of the Indian opium there are several qualities, as Bengal, Patna or Benares opium, Garden Patna, Malwa, fine Malwa, Cutch, and Kandeish opium.

About 40,000 chests of opium (of 140 lbs.) are annually produced in the native states of Central India, Rajputana, and Baroda, which pay a transit duty for export from Bombay. The bulk of the Indian product finds its

way to China. Next to China, the largest consumption of Indian opium is by the Burmese and the natives of the Malacca Straits, who take annually to the value of nearly $5,000,000.

In Europe, with exceptions, which are not numerous, opium is used for medicinal purposes only; and large quantities of it undergo a still further stage of manufacture, in order to separate from it the active principles morphine, narcotine, etc.

Alkaloids of Opium.—Those at present recognized are morphine, which crystallizes in white needles, and which was discovered in 1816 by Sertürner; narcotine (shining prisms or long needles, tasteless, odorless), discovered in 1803 by Derosme, although its basic nature was first shown by Robiquet in 1817; codeine (nearly colorless octahedra), discovered in 1832 by Robiquet and described by Grimaux in 1881; prepared from morphine by heating it with methyl iodide and soda, it is methylmorphine; narceine or narceia (long quadrangular prisms or white silky needles, odorless), discovered in 1832 by Pelletier; pseudomorphine (fine crystalline powder, derived from morphine), also called phormine and oxydimorphine, discovered in 1835 by Pelletier and Thibournevy; thebaine or paramorphine (silver scales or prisms with styptic taste), discovered in 1835 by Thibournevy; paparenine (colorless needles or prisms), discovered by Merck in 1848; rhoeadine (white tasteless prisms), discovered in 1865 by O. Hesse; cryptopine (minute prisms), discovered in 1867 by T. and H. Smith; oxynarcotine (isolated from the mother liquor of narceine), discovered in 1876 by Wright and Beckett; gnoscopine (woolly needles, obtained from narceine), discovered in 1878 by T. and H. Smith. In 1870-8 O. Hesse announced the discovery of lanthopine (finely crystallized), meconidine (amorphous, not stable), laudanine (large crystals), codamine (crystalline), deuteropine, laudanosine (crystallizable), and protopine (crystallizable). The discovery of hydrocatarnine (crystallizable) was announced in 1869 by Mathieson and Wright. Apomorphine or apomorphia, derived from morphine or codeia, although a depressant, is a prompt and valuable emetic.

Of the alkaloids of opium, morphine, codeine, and narceine are of most importance. Morphine i its action on the body very nearly represents that of the crude drug. The average dose of opium for an adult is one grain; of morphine, ⅛ to ¼ grain. Codeine acts like morphine, but is weaker, and is less likely to be followed by headache, constipation, and other unpleasant symptoms. It is used principally to allay pain and coughs. 'Codeine, paparenine, crytopine, and narceine have a certain soporific action, but the remainder of the alkaloids are almost devoid of it.'

Officinal Preparations of Opium.—The principal preparations (including the alkaloids) are the acetate, hydrochlorate, and sulphate of morphia, sulphate of codeia,

powdered opium, pills of opium (opium and soap), Dover's powder (opium, ipecac, and sugar of milk), troches of licorice and opium, tincture of opium (laudanum), deodorized tincture (McMunn's elixir), camphorated tincture (paregoric), tincture of ipecac and opium (liquid Dover's powder), vinegar and wine of opium, and opium liniment. The use by the physician of one or other of these preparations is to a certain extent a matter of personal habit. The alkaloids are generally considered to act more promptly than opium itself and its solid and liquid preparations, and to be less constipating. Solutions of opium are more prompt in action than solid preparations and salts of morphine than morphine itself.

Properties and Use of Opium.—Opium is a stimulant narcotic; in small doses, stimulant; in larger, a sedative; and in still larger, a narcotic poison. It is readily absorbed from the stomach, less quickly from the rectum and vagina, and very little from the skin, if it is not abraded. When injected under the skin (subcutaneous, hypodermic, or hypodermatic use), its action, as a rule, is rapid. Opium is used by many nations for its exhilarating and anodyne influences, being either eaten, smoked, or used as a substitute for alcoholic drinks. Medically, it is used to relieve pain, to produce sleep in certain low conditions, to allay nervous irritation, as in coughs, to check excessive secretion, as in diarrhœa, dysentery, and diabetes, and to support the system when sufficient food cannot be retained. The action of opium is not always uniform. With some individuals, due to age, race, temperament, condition of health, personal idiosyncrasies, etc., opium produces effects different from the ordinary results, such as delirium, cramps, vomiting, severe headache, and itching of the skin. Young children, old people, and persons of a nervous temperament are particularly susceptible to the influence of opium; small doses sometimes producing in these coma and even death. On the other hand, severe pain, flooding, etc., sometimes requires three to four times the ordinary dose. Many of the soothing syrups and carminatives contain opium. It is believed by many physicians that morphine should never be given to a child under 10, nor a hypodermic injection to a child under 15. In frogs small doses of opium produce tetanus; in mice, convulsions; they stupefy dogs and rabbits; while it requires large doses to poison ducks, chickens, and pigeons. In small doses, opium usually excites or stimulates, increasing the fulness, force, and frequency of the pulse, the temperature of the skin, the power of the muscles, arousing mental action, and affording bodily and mental calm. In a variable time, usually within an hour after the opiate has been taken, there is a disposition to sleep or repose. On arousing from sleep there is frequently headache, with nausea, tremors, etc., until the body recovers its energy. Most of the secretions are diminished by opium, the peristaltic action of the bowels lessened, pain and muscular contractions or spasms allayed, and

nervous irritation relieved, but always with the risk of repetitions of the dose and the formation of the opium habit.

Opium-Poisoning.—This is quite frequent, due to the overuse of the drug to relieve pain or produce sleep, or as an indulgence, it being unfortunately too easy to procure opiates. Poisoning is principally from the salts of morphine, either used alone or in patented compounds. The primary or stimulant effects may be loquacity, restlessness, and hallucinations, although the period of exaltation may be short, if present at all, the symptoms of the second or intermediate period rapidly appearing. These are similar to those of congestion of the brain, weariness, dulness, drowsiness, a sense of weight in the extremities; the face is pale, suffused, or cyanotic; the pupils are slightly contracted; the breath is slow, and may be deep and stertorous; the skin may be dry and warm, or cool and wet; the pulse is generally normal; the patient is unconscious, but may be roused by shaking, by the infliction of pain, or by loud talking; and when aroused, his breathing becomes more rapid. In the third period, that of narcosis or coma, the patient cannot be aroused; the face is pale and cyanotic (bluish, especially the lips); the pupils are insensible to light, usually contracted to the size of a pinhead, sometimes dilated toward the end of life; the pulse is rapid and feeble; breathing is slow and shallow, with increasing intervals and sometimes is stertorous; the skin is bathed at first in warm perspiration, then becomes cold and clammy. Convulsions are rare. Recovery may even now take place, or death occurs from failure of respiration and arrest of the heart's action. A post-mortem examination may reveal nothing abnormal; or the brain may be congested, the vessels of the cerebro-spinal axis gorged with dark blood, the lungs, heart, liver, and spleen distended with dark fluid blood, and serum may fill the ventricles and be beneath the arachnoid.

Treatment of Opium-Poisoning.—Produce emesis, with copious drafts of warm water, with a tablespoonful of salt or a teaspoonful of mustard well stirred in; by tickling the throat with a feather; or by use of a stomach-pump; apply cold affusions to the head and spine, and flagellation to the palms, soles, and calves, and with a damp towel to the back; keep the patient walking briskly, though he begs for rest; give strong coffee and aromatic spirits of ammonia; frequently use the Faradaic current upon the limbs; and resort to artificial respiration if necessary.

The Opium-Habit.—Indispensable as opium is in certain affections, in the hands of the thoughtless and weak it is too often a curse. It is the most seductive of all the narcotics. 'By its soothing and exhilarating influences it gains such a hold on the moral and physical nature that the strongest will is unable to emancipate the victim from its enchantment, and moral degradation results.' With children, its frequent use in cough-mixtures, car-

minatives, etc., interferes with the assimilation of food, enervates the system, and prepares the way for depraved appetites. The opium-habit seems to be a disease of comparatively recent times, dating, as some believe, from the invention of the hypodermic syringe in 1848. Undoubtedly the consumption of opium has increased steadily within the last 50 years. This is due largely to the fact that neuroses have increased, owing partly to a more and more hurried and intense mode of living, and in part to the ease with which opiates are obtained and the attractive forms in which they are presented—granules, triturates, etc. The habit is often induced by the frequent use of opium to relieve pain or produce sleep, or is contracted simply through yielding to sensuous enjoyment, as in opium-smoking. It may also be due to defective will-power, transmitted sometimes in a neurotic taint from opium-taking parents and grandparents.

Victims of the opium-habit frequently become so demoralized as to need care in an asylum. They lie, steal, lose self-respect and ambition, are forgetful, may be subject to delusion, fear, and superstition, and are careless as to clothing and necessary habits, while still thinking highly of themselves. The great nerve-centres tolerate stimulation to a certain point. When the limit is reached, the time varying in different persons, the action of the various organs and tracts is disordered. The victim of opium suffers from imperfect digestion, faulty appetite and assimilation, and consequent mal-nutrition. The red blood corpuscles diminish, he is pale, has nausea, muscles are flabby, and endurance weakens. The kidneys become affected, the skin is congested, and when the disease is advanced, purpura appears. There is often a malaria-like fever. The functions of the testicles in the man and of the ovaries in the woman are suspended. Primarily there is functional derangement of the brain, then permanent deterioration. He becomes a slave to his depraved appetite. When the time draws near for his allotted dose he is nervous, yawns, may have neuralgia, is weak, breaks out into a perspiration, and is miserable. He takes his dose, and is himself again; but after a time the dose has to be increased, and if relief from his craving is not obtained he sinks lower and lower and dies a wretched death. Two methods of cure are employed; one is the gradual reduction of opiates, the other is their sudden withdrawal—in either case giving in their stead bitter tonics, stimulant carminatives, such as ginger, and certain stimulants and medicines. The law holds opium habitués, as it does drunkards, responsible for crimes which they commit.

Opium in Asiatic countries is chiefly smoked and not eaten, a special pipe and lamp being employed. Before it is suited for smoking it goes through several processes, which bring it into the form of a blackish paste. The pipe, or rather the stem of the pipe, is made of heavy wood, and is about the length and size of an ordinary

flute; the bowl is generally made of earthenware. The smoker, who is reclining, takes a small portion of opium about the size of a pea on the end of a spoon-headed needle, heats it at the lamp, and then places it in the bowl of the pipe, the pellet of opium having previously been perforated with the needle. He then brings the opium to the flame of the lamp, inhales the smoke in several inspirations, and is then ready to repeat the process with a fresh quantity of opium. The smoke is exhaled through the nostrils. Old smokers are able to fill the lungs with it. The smell of the burning opium is rather sickening to those unaccustomed to it.

In China probably about 1 per cent of the entire population smoke opium, but the habit is growing rapidly. Fines, penalties, and even death have been found ineffective to stop the practice. The Japanese government has always steadfastly opposed opium. In Formosa, since that island has become Japanese territory, the Japanese have restricted, and hope eventually to abolish, opium smoking. By a local law of the church, all Roman Catholics in China are forbidden to engage in the cultivation, sale, or smoking of opium. It is universally recognized as a great evil throughout China, the stress being most severe upon the laboring classes, who spend on the drug a large portion of their earnings, and so bring ruin on themselves and their families, too little income being left for food or clothing. Among the richer classes the habit diminishes energy and lowers the moral tone.

In the Philippines the opium traffic, which is a deep-rooted evil, is a question of prohibition versus some form of license. A measure proposed by the United States government for the regulation of the traffic was suppressed in consequence of a vigorous outcry raised in the States against the legalization of the traffic in the drug, and against any form of governmental participation in the profits realized from its sale. Under the law of Spain in force in the Philippine Islands for years before the American occupancy, the Filipinos were forbidden to smoke or use opium, and all dealers in opium were forbidden to sell the drug to the Filipinos or to permit it to be used on their premises by Filipinos. The Spanish system provided for the sale of the privilege of selling opium to Chinamen in each province to an opium farmer or contractor. It provided that opium should only be used or smoked in certain places, which were under the surveillance of the police, and if a Filipino was found in such resorts he was arrested and the owner of the resort was subjected to punishment. This was the system at the time of the American occupation. The Spaniards recognized the habitual use of the drug by Chinamen and the futility of attempting its prohibition, surrounded it with laws which kept it under governmental control, and virtually prevented its use by Filipinos, who showed no disposition to acquire the habit. These laws were not continued by the American authorities, and the only checks upon the sale and use of the drug was a duty im-

posed in the custom-house and a provision in the municipal code requiring municipal councils to pass ordinances punishing the keepers of dives in their respective towns.

The tariff revision law of 1901 provided a duty of $3 per kilo for crude opium and $3.50 for manufactured; this was increased to $4 and $5 respectively in 1905, and a heavy internal revenue tax also imposed. Since 1908, March 1, the laws enacted by Congress have prohibited the importation of opium except for medicinal purposes, and the Philippine authorities have legislated with a view to the total extinction of the opium traffic and habit. What this means may readily be seen from the statement of the imports of the drug into the islands since American occupation: (1899) 91,823 pounds, value $255,310; (1900) 155,672 pounds, value $477,027; (1901) 221,683 pounds, value $619,338; (1902) 285,443 pounds, value $819,625; (1903) 259,473 pounds, value $721,551; (1904) 249,770 pounds, value $770,596; (1905) 268,128 pounds, value $850,381; (1906) 150,292 pounds, value $440,464; (1907) 169,933 pounds, value $513,287; and for the nine months ending with March 1908, 50,776 pounds, value $143,670. Based upon an average for the last four years the loss of duties alone will amount annually to $321,636. Consult: *United States Dispensatory and Reference Handbook of the Medical Sciences;* Potter, *Handbook of Materia Medica, Pharmacy, and Therapeutics* (1901). See also *Reports* of the Philippine Commission for 1905, 1906, and 1907.

OPOBALSAM, n. *ŏp'ŏ-bawl'săm* [Gr. *opos,* juice; *balsamon,* the balm juice, balsam]: the balsam of Gilead, an oleo-resin of a peculiar fragrancy; the secretion from the *Balsămodcn dron gilĕăden'sĕ,* ord. *Burscrācĕæ:* see Balsam Gum.

OPODELDOC, n. *ŏp'ŏ-dĕl'dŏk* [word coined by Paracelsus]: popular synonym for *Soap Liniment* (q.v.). *Note.*—The *opo* is the same as the *opo* in *opopanax, opobalsam,* etc., doubtless from the Gr. *ὀpos,* juice. It has been suggested by an eminent Anglo-Saxon scholar that the original word was *opodilla,* and that *doc* or *dock* was added merely as a gloss to *dilla*—a view confirmed by the fact that in Ælfric's *Glossary, dill* (*dilla*) is Englished by *dock.*

OPOPANAX, n. *ŏ-pŏp'ă-năks* [Gr. *opopănax*—from *opos,* juice; *panax,* a plant, all-healing (see Panacea)]: a gum-resin, the dried juice of a plant, imported in loose granules or drops, used as a medicine; obtained by puncturing the roots of *Opopŏnax chirōnium,* native of s. Europe, ord. *Umbellĭfĕræ.* Ancient physicians attached great importance to O. as an antispasmodic. Hippocrates, Theophrastus, and Dioscorides have each left descriptions of it. The plant grows generally throughout s. Europe, and the gum is still collected, but is little used.

OPORTO.

OPORTO, *ō-pōr'tō* (Portug. *O Porto*, the port): city of Portugal; after Lisbon, the most important seaport of the country; in the province of Minho, on the right bank, two m. from the mouth of the Douro; lat. 41° 9′ n., long. 8° 37′ w.; 195 m. n.n.e. of Lisbon. Though possessing few imposing edifices, the town, seen from a distance, with its irregular outline marked with many towers, its whitewashed houses gleaming among trees and terraced gardens, has a fine picturesque effect. Its picturesqueness, however, has been secured at some cost of comfort, as many of its streets are narrow, dirty, and so steep as to be impassable for carriages. Of the old walls that surrounded the ancient town, remains are still seen. The principal street is the *Rua Nova dos Inglezes*, a spacious, handsome, modern thoroughfare, from which is obtained a good view of the Bishop's Palace, which seems hung high in air. Here is one of the finest edifices in Oporto, the English Factory House, of white granite with beautiful façade, and comprising on a magnificent scale all appurtenances of a club-house. The houses in the *Rua Nova de S. João*, most regular street in the city, are lofty, faced with gayly painted and gilt balconies. Of the 11 squares, the greatest is the *Praça de San Ovidio* on a height, with beautiful buildings, and a terrace with a fine seaward view, and planted with trees. On the high rocks, on the s. bank of the river, stands the convent of *da Serra*, formerly extraordinarily rich. The most beautiful of the convents was that of *S. Bento*, now converted into barracks. The cathedral, originally a noble edifice, but infamously modernized, stands near the Bishop's Palace. The *Torre dos Clerigos* (Tower of the Clergy) said to be the highest in Portugal, was built 1748. There are four hospitals, and numerous educational and benevolent establishments. Oporto is the principal industrial seat in the country. It carries on manufactures of linen, silk, cotton, and woolen fabrics, cloth of gold, silk and cotton hosiery, lace, buttons, gold and silver wire, cutlery and hardware, excellent furniture, pottery, glass, leather, paper, hats, sails, and the articles required on ship-board. Royal tobacco and soap-works, two iron-foundries, and several sugar-refineries are in operation. The entrance to the Douro is rendered highly dangerous by a shifting bar of sand; yet the commercial traffic is considerable.

In ancient times, the site of Oporto was occupied by the harbor-town *Portus Cale*, afterward *Porto Cale*, from which has been derived the name of the kingdom, Portugal. It was an important city during the supremacy of the Moors, was destroyed 820 by Almansor of Cordova, but was restored and peopled by a colony of Gascons and French 999. It was famous for the strength of its fortifications during the middle ages, its walls being 3,000 paces in circumference, 30 ft. high, flanked with towers. From the 17th to 19th c., Oporto has been the scene of an unusual number of popular insurrections. In 1808, it was taken by the French; but in the following year it

was retaken by an Anglo-Portuguese force under Wellington. In 1832, Dom Pedro, ex-emperor of Brazil, was unsuccessfully besieged for a year in this city by the forces of Dom Miguel.—Pop. (1900) 172,421.

OPOSSUM, n. *ŏ-pŏs'sŭm* [originally *opassom*, in the language of the Indians] (*Didelphis*): genus of *Marsupiata*, quadrupeds having ten cutting teeth in the upper jaw, and eight in the lower, one canine tooth on each side in each jaw, three compressed premolars, and four sharply-tuberculated molars on each side—50 teeth in all; tongue bristly; tail long, prehensile, and in part scaly; feet plantigrade; five toes on each foot, their claws long and sharp; but the inner toe of the right foot converted into a thumb, destitute of a claw, and opposable to the other digits; muzzle long and pointed, mouth very wide, ears large and destitute of hair. The unwebbed feet and non-aquatic habits distinguish this genus from *Cheironectes* (q.v.), also belonging to the family *Didelphidæ*. But the genus *Didelphis* itself is divided by some naturalists into several generas; and there are differences not unimportant, particularly in the well-developed pouch of some species, and the merely rudimentary pouch or abdominal folds of others. All existing species are American, but fossil species are found in other parts of the world. The opossums were the first marsupial animals known, and are noticed as very wonderful creatures by some of the earliest writers on America. Some of the smaller species much resemble rats and mice, except in their long and pointed muzzle; others greatly resemble shrews; the largest known species are scarcely equal in size to a large cat. It is in some of the smaller species that the pouch is rudimentary; all the larger species have a well-developed pouch, in which the young are carried, and to which, even after beginning to venture forth from it, they retreat on the approach of danger. The young of the species which have a merely rudimentary pouch, also remain attached to the nipple of the mother for a time; and afterward for a time are carried on her back, intwining their prehensile tails with hers, and clinging to the fur of her back.—The Virginian Opossum (*D. Virginiana*) is one of the largest species. It abounds in warmer parts of N. America, and its range extends considerably n. of Virginia. Its form is robust, its head very large, its color dull white; its fur long, fine, and woolly, thickly interspersed with longer coarse white hairs, except on the head and some of the upper parts, where the hair is short and close. The tail is not quite so long as the body. The Virginian opossum lives much in forests and among branches of trees, to which it usually retreats to devour its prey, twining its tail around a branch for security. Its food consists of small quadrupeds and reptiles, birds' eggs, and insects; also in part of fruits and the juicy stalks of plants. It often visits poultry-yards, and is cunning in its stealthy quest of prey; though otherwise it seems, like the other *Mar-*

supiata, to be very low in the scale of intelligence. It seeks to escape from enemies by running to the woods and ascending a tree; but if escape is impossible, it feigns death, and maintains the imposture in very trying circumstances, however it may be kicked and beaten; but the true state of the case may be ascertained by throwing it into water; hence the colloquial phrase 'playing 'possum.' The female sometimes produces 16 young at a birth; the young when born are blind, naked, and shapeless, and weigh scarcely more than a grain each; they do not begin to leave the pouch until they have attained about the size of a mouse. The female opossum shows very strong attachment to her young. The opossum is very easily tamed, but its strong odor makes it an unpleasant pet. The flesh by many is considered good food. The hair is woven into garters and girdles by Indian women.—The Crab-eating Opossum (*D. cancrivora*) of Guiana and Brazil, nearly as large as the Virginian O., lives chiefly in marshy places and feeds much on crabs. The smaller species are numerous in tropical America.—The name opossum is often given in Australia to the Phalangers (q.v.).

OPOSSUM-MOUSE: one of the diminutive, active, very mouse-like phalangers of the genus *Acrobates*.

OPOSSUM-RAT: a book-name, translated from the local name '*raton runcho*,' in Ecuador, of a rare little marsupial inhabiting the northern Andean region, which is of special interest because it represents in America an entirely different branch (the diprotodont) of marsupials from the marsupials, and is the sole survivor of an extinct family (*Epanorthidæ*) formerly prevalent in Patagonia. It looks like an opossum of the size of a rat, lives in high brush-wood, feeds mainly on birds and their eggs, and specimens are obtained rarely and with difficulty. It was first described in the *Proceedings* of the Zoological Society of London for 1860, by R. F. Tomes, in working out a collection of small mammals obtained by Louis Fraser in Ecuador, published the first notice of *Canolestes*, which he described under the name *Hyracodon fuliginosus*. Oldfield Thomas, F. Z. G., rediscovered Tomes' genus in a specimen obtained near Bogotá. This specimen Thomas found it necessary to consider as representing a new species. The name Hyracodon having been found to be preoccupied, Thomas suggested Cœnolestes, calling his specimen *obscurus* and Tomes' *fuliginosus*. Consult: Thomas, *Proceedings*, Zoological Society of London for 1895, p. 870.

OPOSSUM-SHRIMP: a small, shrimp-like marine crustacean of the order *Schizopoda*, so called because of the egg-carrying pouches between the thoracic legs of the female.

OPPENHEIM, *ŏp'ĕn-hīm*, E. Phillips: English novelist. He was educated at Leicester, England, and among his published works, several of which have had many readers in this country, are: *Enoch Strone; A Man and*

his Kingdom; A Millionaire of Yesterday; The Survivor; The World's Great Snare; The Yellow Crayon (1903); etc.

OPPENHEIM, NATHAN: American physician: b. Albany, N. Y., 1863, Oct. 17. A graduate of Harvard (1888), and of the College of Physicians and Surgeons (1891), he has made a specialty of the diseases of children. He has published in that field: *The Development of the Child* (1899); *The Medical Diseases of Childhood* (1900); *The Care of the Child in Health* (1901); *Mental Growth and Conditions of Children* (1902).

OP'PER, FREDERICK BURR: American illustrator: b. Madison, Ohio, 1857, Jan. 2. He left school at 14, worked in a newspaper office and then in a store in New York, soon succeeding in getting his humorous sketches published. He was employed upon the Frank Leslie publications three years, and was associated with Puck 1880-99. In the last named year he joined the staff of the New York *Journal*. He has published several of his series of humorous drawings in book form.

OPPERT, *ŏp'pĕrt*, F. *o-pār'* JULES, PH.D.: b. Hamburg, 1825, July 9; d. Paris, France, 1905, Aug. 21. After completing the law course at Heidelberg he studied Oriental languages at Bonn and afterward at Berlin, giving special attention to the Zend language and its literature. On account of his Jewish descent and his adhesion to the Hebrew faith he was unable to secure a professorship in a German university. He removed to France, was professor of German at Laval 1848, and at Rheims 1850, and was a member of the scientific expedition sent by the French government to Mesopotamia 1851. Soon after his return he took out naturalization papers and became a citizen of France. The Institute grand prize of 20,000 francs was awarded him 1854 for his method of interpreting cuneiform inscriptions. He received 1857 the appointment of professor of Sanskrit at the school connected with the Imperial Library. He published *Études Assyriennes; Grammaire Sanscrite; Fragments Mythologiques; Deux textes très anciens de la Chaldée; Les Inscriptions des Achéménides* (1852); *Grande Inscription du Palais de Khorsabad* (1863); *Le Peuple et la Langue des Mèdes* (1879); *Études sumériennes* (1881); *Le Calendrier perse* (1899); etc.

OPPIDAN, n. *ŏp'pĭ-dăn* [L. *oppĭdum*, a city or town]: at *Eton*, a boy who is not a king's scholar, and who boards in the town: ADJ. relating to a town.

OPPONENT, n. *ŏp-pō'nĕnt* [L. *opponens*, or *opponen'tem*, setting or placing against—from *ob*, against; *pono*, I set or place: It. *opponente*]: one who opposes, as in argument or controversy; an adversary; a rival: ADJ. that opposes; adverse. OPPO'NENCY, n. *-nĕn-sĭ*, an exercise for an academical degree; the opening of a disputation.—SYN. of 'opponent': enemy; antagonist; opposer; foe.

OPPORTUNE, a. *ŏp′pŏr-tūn* [F. *opportun*—from L. *opportūnus*, fit, convenient—from *ob*, over, against; *portus*, the harbor: It. *opportuno*]: well-timed; seasonable; proper; convenient. OP′PORTUNE′LY, ad. *-lĭ*. OP′PORTUNE′NESS, n. *-nĕs*, the quality or condition of being opportune or timely. OPPORTUNITY, n. *ŏp′pŏr-tū′nĭ-tĭ* [F. *opportunité*—L. *opportunitas*]: fit or convenient time, place, or occasion; suitableness of circumstances to any end.—SYN. of 'opportunity': occasion; occurrence; convenience; time.

OPPOSE, v. *ŏp-pōz′* [F. *opposer*, to oppose—from F. *poser*, to place: L. *oppositus*, set or placed against—from *ob*, against; *positus*, set or placed]: to set against; to act against; to resist; to put one's self in opposition, as a competitor; to object or act against, as in a controversy or debate; to place as an obstacle; in OE., to place in front or over against; to act adversely. OPPO′SING, imp. OPPOSED, pp. *-pōzd′*. OPPO′SER, n. *-zẽr*, one who opposes. OPPO′SABLE, a. *-ză-bl*, capable of being opposed or resisted. OPPOSITE, a. *ŏp′pō-zĭt* [F.—L.]: standing or placed in front: facing; contrary; in *bot.*, applied to leaves placed on opposite sides of a stem at the same level: N. the reverse; that which is contrary. OP′POSITELY, ad. *-lĭ*. OP′POSITENESS, n. *-nĕs*, the state of being opposite or contrary. OPPOSITION, n. *ŏp′pō-zĭsh′ŭn* [F.—L.]: standing over against; resistance; hostility; contrariety of interests or designs; contradiction; in *astron.*, the aspect of heavenly bodies when 180° apart—that is, when one heavenly body is in the quarter of the heavens directly opposite to another, as a planet to the sun; in *politics*, the collective body of the opponents of a ministry or government, especially in either house of the British parliament. The existence of a fair and temperate opposition, keeping watch over the acts of the ministry, is conducive to good government; but mere factious obstruction may seriously damage public interests. The name Opposition is not usually applied to a party merely because opposed to the existing administration, but only when there is likelihood of that party's succeeding to power on a change of government. OP′POSI′TIONIST, n. *-ŭn-ĭst*, one who belongs to the opposing party. OPPOSITIVE, a. *ŏp-pŏs′ĭ-tĭv*, that may be put in opposition. OPPOSE′LESS, a. irresistible; incapable; of being opposed.—SYN. of 'oppose': to resist; withstand; thwart; combat; contradict; deny; oppugn; check; obstruct; contravene; hinder.

OPPRESS, v. *ŏp-prĕs′* [F. *oppresser*—from mid. L. *oppressārĕ*, to overburden: L. *oppressus*, pressed against, crushed—from *ob*, against; *premo*, I squeeze]: to treat with unjust rigor, severity, or hardship; to overburden; to sit or lie heavily on; to overpower. OPPRES′SING, imp. OPPRESSED′, pp. *-prĕst′*: ADJ. overburdened; depressed. OPPRES′SOR, n. *-sẽr*, one who oppresses or harasses with unjust severity. OPPRES′SION, n. *-prĕsh′ŭn* [F.—L.]: the imposition of unreasonable burdens or exactions; the state of being overburdened; cruelty; severity; dulness

of spirits; a sense of heaviness, as in respiration. OPPRES'SIVE, a. *sĭv*, unjustly or excessively severe; tyrannical; extortionate; overwhelming. OPPRES'SIVELY, ad. *-lĭ*. OPPRES'SIVENESS, n. *-nĕs*, the quality of being oppressive.

OPPROBRIOUS, a. *ŏp-prō'brĭ-ŭs* [L. *opprobrĭōsus*, full of reproach—from *opprōbrĭum*, reproach, disgrace: It. *obbrobrioso;* Sp. *oprobioso*, opprobrious]: offensive, reproachful; abusive; infamous; rendered hateful. OPPRO'BRIOUSLY, ad. *-lĭ*. OPPRO'BRIOUSNESS, n. *-nĕs*, or OPPRO'BRIUM, n. *-brĭ-ŭm*, reproach mingled with contempt or disdain; disgrace; ignominy.

OPPUGN, v. *ŏp-pūn'* [OF. *oppugner*, to oppugn—from L. *oppugnārĕ*, to fight against, to assault—from *ob*, against; *pugna*, a fight: It. *oppugnārĕ*]: to oppose or resist—used only of verbal or written warfare. OPPUGN'ING, imp. OPPUGNED, pp. *ŏp-pūnd'*. OPPUGN'ER, n. *-ẽr*, one who opposes or attacks in verbal or written warfare. OPPUGNANCY, n. *ŏp-pŭg'năn-sĭ*, in OE., opposition.

OPSIOMETER, n. *ŏp'sĭ-ŏm'ĕ-tẽr* [Gr. *opsis*, sight; *metron*, measure]: an instrument for measuring the extent or limits of distinct vision in different individuals.

OPSONIN, n. *ŏp'sō-nĭn* [Gr. *opson*, sauce, seasoning]: a substance present in the blood serum which acts upon bacteria in such a way as to render them susceptible to attack by the phagocyter. See PHAGOCYTE.

OPTATIVE, a. *ŏp'tā-tĭv* [F. *optatif*, optative—from L. *optatīvus*, expressing a wish—from *optātŭs*, wished or desired] expressive of desire or wishing; in *Gr. gram.*, applied to a mood of the verb. OPTATION, n. *ŏp-tā-shŭn*, expression of a wish.

OPTIC, a. *ŏp'tĭk*, or OPTICAL, a. *ŏp'tĭ-kăl* [Gr. *optĭkos*, relating to the sight—from *opsomai*, I shall see: F. *optique*]: relating to the sight; visual; relating to the science of optics. OP'TIC, n. an organ of sight. OP'TICALLY, ad. *-lĭ*. OPTICS, n. plu. *ŏp'tĭks*, the science which treats of everything that pertains to light or vision, and the construction of such instruments as telescopes, microscopes, etc., in which light is the chief agent (see OPTICS, page 119): *familiarly*, the organs of sight. OPTICIAN, n. *ŏp-tĭsh'ăn*, one who constructs and sells instruments and glasses to aid vision. OPTIC NERVES, the second pair of nerves which proceed directly from the brain, and which are the nerves of sight: see EYE.

OP'TICAL ILLU'SION: deceptions arising in, or producing their effect through, the sense of sight. This sense often deceives us as to the distance, size, shape, and color of objects; it frequently makes them appear in situations where their existence is impossible; and often makes us think them movable when they are not so; and *vice versâ*. An object appears to us as large or small, near or distant, according as the rays from its opposite borders meeting at the eye form a large or a small angle; when the angle is large, the object is either large or near; when small, the object must be small or distant.

Practice alone enables us to decide whether an object of large apparent size is so on account of its real size, or of its proximity; and our decision is arrived at by a comparison of the object *in position*, with other common objects, such as trees, houses, etc., which may chance to be near it, and of which we have by experience come to form a correct idea. The same is, of course, true of apparently small objects. But when all means for comparison are removed, as when we see a distant object floating on an extensive sheet of water, or erect in an apparently boundless sandy plain, where no other object meets the eye, then our judgment is completely at fault. Imperfection in the acquired perceptions of sight, as it is called, produces many other illusions; it leads us to consider spherical solids at a distance as flat disks, and deceives us regarding the size of objects, by their color; the sun appears larger than he would if illumined by a fainter light, and a man in a white garment seems larger than if he wore a dark dress. Illusions are produced also by external causes: for instances, see MIRAGE; REFLECTION; REFRACTION.

The property which the eye possesses of retaining an impression for a very brief, though sensible period of time (about one-quarter of a second), after the object which produced the impression has been removed, produces a third class of illusions. Common examples of this are the illuminated circle formed by rapid revolution of a luminous body. Another form of illusion is produced to a person who is seated in a vehicle in motion, especially when the motion is so equable as not to be felt by the person himself. The illusion is most complete when the attention is riveted on an object several yards off; this object then appears as a centre round which all the other objects seem to revolve, those between the observer and the object moving backward, and those beyond the object moving forward. Other illusions arise from a disordered state of the organs of vision; such are the seeing of things double of movable (when they are not so), or of a color different from the true one; etc. See ILLUSION.

OP'TICS: science whose object is investigation of the laws that regulate the phenomena of light and vision. For the nature of light, see LIGHT; see also various connected topics, such as CATOPTRICS; CHROMATICS; DIFFRACTION; INTERFERENCE; LENS; POLARIZATION; REFLECTION; REFRACTION; SPECTRUM; etc.: also MICROSCOPE; TELESCOPE.

Optics, as a science, is entirely of modern growth, for though the Greeks and their disciples the Arabs had made some progress in mathematical optics, their knowledge was confined to the law of reflection and its immediate consequences. Euclid, Aristotle, Archimedes, Hero, and Ptolemy were acquainted with the fact that light is transmitted in straight lines, but with the important exception of Aristotle, and some of his followers, the ancient philosophers believed that rays proceeded *from* the eye

to the object, instead of in the contrary direction. Ptolemy was well acquainted with atmospheric refraction. Alhacen (1070) and Vitellio the Pole (1260) were almost the only cultivators of this science during the middle ages, and their additions to it were unimportant. The lens, though known from early antiquity, was not applied as an aid to defective eyesight till after the time of Roger Bacon. Jansen, Metius, and Galileo separately invented the telescope about the beginning of the 17th c.; and the last-mentioned philosopher, by its means, made various important astronomical discoveries. Kepler, a short time afterward gave the true theory of the telescope, explained the method of finding the focal length of lenses, and applied it to find the magnifying power of the telescope, besides pointing out the mode of constructing an instrument better adapted for astronomical purposes than that of Galileo; he also made useful experiments on the nature of colors, and showed that images formed on the retina of the eye are inverted, a fact previously discovered by Maurolycus of Messina. From this period the science of O. steadily advanced, and its treasury of facts received numerous additions through the labors of De Dominis, Snell (discoverer of the law of refraction 1621), Descartes, Fermat, Barrow, Mariotte, and Boyle. Till the time of Newton it was generally believed that color was *produced* by refraction, but that philosopher showed by a beautiful series of experiments that refraction only separates the colors already existing in white light. In his hands the theory and construction of the telescope underwent many valuable improvements, and 1672 the description of his *reflecting* telescope was submitted to the Royal Soc. Gregory had constructed an instrument on similar principles some years before. About the same time, Grimaldi made his interesting series of experiments on the effects of diffraction, and noticed the remarkable fact of the interference of one pencil of light with the action of another. The complete theory of the rainbow, with an elegant analysis of the colors of thin plates, and the hypothesis concerning the nature and propagation of light, now known as the 'corpuscular' theory, completed Newton's contributions to the science. The important services of the ingenious but eccentric Hooke cannot be easily stated in such a brief abstract, as he discovered a little of everything, completed nothing, and occupied himself to a large extent in combating faulty points in the theories of his contemporaries. It must not, however, be forgotten that he has as much right as Huyghens to the credit of originating the undulatory theory, the favorite one at present. The double refraction of Iceland spar was discovered (1669) by Bartholin, and fully explained 1690 by Huyghens, propounder of the undulatory theory, who also considerably aided the progress of mathematical optics. The velocity of light was discovered by Römer (1675), and 1720 the aberration of the fixed stars and its cause were made known by Bradley, who likewise

determined with accuracy the amount of atmospheric refraction. Bouguer, Porterfield, Euler, and Lambert rendered essential service to physical optics; the same was done for the mathematical theory by Dollond (inventor of the achromatic telescope), Clairaut, Dalembert, Boscovich, etc.; while in later times the experiments of Delaval on the colors produced by reflection and refraction; the discussion of the phenomena arising from unusual reflection or refraction, carried on by Vince, Wollaston, Biot, Monge, and others; the discovery of polarization of light by Malus (1808), and its investigation by Brewster, Biot, and Seebeck; of depolarization by Arago (1811), and of the optical properties as connected with the axes of crystals (1818) by Brewster; and the explanation of these and other optical phenomena, in accordance with the undulatory hypothesis by Young—discoverer of the *Interference* (q.v.) of rays—and Fresnel, went far to give optics a width of scope and symmetry possessed by few other sciences. The development of the undulatory theory and of optical science generally has been carried on in the present century by Lloyd, Airy, Cauchy, and others; and more recently important discoveries in connection with the physical modifications and chemical properties of light have been made (the latter, as far as the spectrum is concerned, chiefly by Kirchhoff), for a notice of which, and other discoveries, see PHOTOGRAPHY; SPECTRUM; etc.

OPTIMATES, n. plu. *ŏp-tĭ-mā'tēz* [L. *optimātes,* the grandees—from *optĭmus,* the best]: the nobility of anc. Rome; the conservative or aristocratic party, as opposed to the democratic or progressive *populares:* men of wealth were not necessarily optimates unless they had also personal influence and a following. OPTIME, n. *ŏp'-tĭ-mĕ,* in *Cambridge University* till recently, one who stood in the second or third class of final honors in mathematics, called senior or junior—the *wranglers* were comprehended in the first class. OPTIMISM, n. *ŏp'tĭ-mĭzm,* doctrine that everything, whether good or evil, is ordered for the best, the opposite or *pessimism.* OP'TIMIST, n. *-mĭst,* one who holds that all events are ordered for the best: see OPTIMISM, below.

OP'TIMISM: doctrine of those philosophers who hold that the existing order of things, whatever its seeming imperfections of detail, is nevertheless, as a whole, the most perfect or the best which could have been created, or which it is possible to conceive. In a practical way people are called optimists who hold that, despite much evil and suffering, happiness and righteousness on the whole preponderate and will increasingly do so. Some of the advocates of optimism content themselves with maintaining the absolute position, that though God was not by any means under obligation—even to His own perfection of character—to create the most perfect order of things, yet the existing order is *de facto* the best; others contend, in addition, that the perfection and wisdom of Almighty God necessarily require that His

creation should be the most perfect which it is possible to conceive. The philosophical discussions of which this controversy is the development are as old as philosophy itself, and form the groundwork of all the systems, physical as well as moral, whether of the Oriental or of the Greek philosophy; of Dualism, Parsism, and of the Gnosticism and Manicheism which afflicted the Christian Church, in the east; and in the west, of the Ionian, the Eleatic, the Atomistic; no less than of the later and more familiar, Stoic, Peripatetic, and Platonistic Schools. In the philosophical writings of the fathers, of Origen, Clement of Alexandria, and above all of Augustine, the problem of the seeming mixture of good and evil in the world is the great subject of inquiry, and through all the subtleties of the mediæval schools it continued to hold an important and prominent place. But the full development of the optimistic theory as a philosophical system was reserved for Leibnitz (q.v.). It forms the subject of his most elaborate work, *Theodicea*, the main thesis of which is, briefly—that among all the systems which were present to the infinite intelligence of God, as possible, God selected and created, in the existing universe, the best and most perfect, physically as well as morally. The *Theodicea*, pub. 1700, was designed to meet the skeptical theories of Bayle, by showing not only that the existence of evil, moral and physical, is not incompatible with the general perfection of the created universe, but also that God, as all-wise, all-powerful, and all-perfect, has chosen out of all possible creations the best and most perfect; that had another more perfect creation been present to the divine intelligence, God's wisdom would have required of Him to select it; and that if another, even equally perfect, had been possible, there would not have been any sufficient determining motive for the creation of the present world. Omitting details of the controversial part of the system, it suffices to say that the existence of evil, both moral and physical, is explained as a necessary consequence of the finiteness of created beings; and it is contended that in the balance of good and evil in the existing constitution of things, the preponderance of the former is greater than in any other conceivable creation. The great theological argument of the optimists is the following: If the present universe be not the best that is possible, it must be that, (1) God did not know of the (supposed) better universe, or that (2) God was not able to create that better one, or that (3) God was not willing to create it. Now, they continue, every one of these hypotheses is irreconcilable with the attributes of God: the first, with His omniscience; the second, with His omnipotence; the third, with His goodness. See Leibnitz, *Theodicea;* Baumeister's *Historia de Mundo Optimo.* While it is not difficult to accept the conclusion known as optimism, the above argument can scarcely be trusted to prove it, inasmuch as the second of the hypotheses referred to cannot be shown irreconcilable with the omnipotence of God. It is not derogatory to God's omnipotence that it cannot make 2

and 2 equal to 99, since that would be absurd and no proper object of power; and though none may be able to prove that the creation of a better universe is thus beyond proper omnipotence, none can prove that it is properly within the range of omnipotence; and in lack of such proof the argument as above fails.

Modern interest in the problem has largely moved away from its theological aspects toward the practical question, 'is life worth living?' In philosophy Schopenhauer defends the negative, Hegel the positive reply to this question. Spencer teaches that evolution must ultimately improve the circumstances of life and the totality of happiness, because disease, sin, and suffering destroy themselves. See PESSIMISM.

OPTION, n. *ŏp'shŭn* [F. *option*—from L. *optiōnem*, free choice—from *optārĕ*, to choose, to wish for]: the power of choosing; right of choice; selection; election; preference; on the *stock exchange*, the liberty to sell or buy stock in a time-bargain at an agreed price. OP'TIONAL, a. *-ăl*, leaving or left to choice or preference. OP'TIONALLY, ad. *-lĭ*, with the privilege of choice.

OPTOGRAPH, n. *ŏp'tŏ-grăf* [Gr. *opsomai*, I shall see; *graphō*, I write]: a telescope for copying landscapes.

OPTOMETER, n. *ŏp-tŏm'ĕ-ter* [Gr. *optikos*, relating to sight: *metron*, measure]: an instrument for measuring the limits of distinct vision; also OPTIMETER.

OPULENT, a. *ŏp'ū-lĕnt* [F. *opulent*—from L. *opulens*, or *opulen'tem*, wealthy, rich—from *opes*, wealth: It. *opulente*]: having large means; rich; wealthy. OP'ULENTLY, ad. *-lĭ*. OP'ULENCE, n. *-lĕns*, wealth; riches; affluence.

OPUN'TIA. See PRICKLY PEAR.

OPUSCLE, n. *ō-pŭs'sl*, or OPUSCULE, n. *ō-pŭs'kūl* [L. *opus'culum*, a little work—from *opus*, a work]: a little work; a brochure.

O'PUS OPERAN'TIS [Lat. work of the worker]: theological phrase, denoting that the effect of a ministration or rite is primarily and directly due, not to the rite itself (*opus*), but to the dispositions of the recipient (*operans*).

O'PUS OPERA'TUM [Lat. work wrought]: phrase in the Rom. Cath. theological schools denoting the manner of the operation of the sacramental rites in the production of Grace (q.v.). It is intended to imply that the ministration of the rite (*opus*) is in itself, through the institution of Christ, an efficient cause of grace, and that, though its operation is not infallible, but requires and presupposes certain dispositions on the part of the recipient, yet these dispositions are but *conditiones sine qua non*, and do not of themselves produce the grace: hence, when the sacraments are administered to dying persons in a state of apparent insensibility, this is done in the hope and on the presumption that the dying person may, though seemingly unconscious, be nevertheless really disposed to receive the sacrament; but it is by no means held that if these dispositions be wanting, the sacrament will itself justify him.

OR, conj. *ŏr* [contracted from AS. *âther*, or, either: Icel. *eda;* Fris. *auder;* Dut. *odder*, or]: a particle that marks an alternative; the correlative of *either*. OR EVER, before: AD. [a corruption of AS. *aer*]: in *OE.*, ere; before; sooner than.

ORACH, or ORACHE, *ŏr'ăk*, or ARRACH, *ăr'ăk* [F. *arroche*, mountain spinach: perhaps a mere corruption of *Atrĭplex* —fr. L. *ater*, black; *plexus*, twisted], (*Atriplex*): genus of plants of nat. order *Chenopodiaceæ*, having male, female, and hermaphrodite flowers; the male and hermaphrodite flowers with a 3–5-partite calyx, and 3–5 stamens; the female flowers with a compressed and 2-lobed or 2-partite calyx. The species are numerous. Some are frequent in waste places, and as weeds in gardens in Europe. GARDEN O. (*A. hortensis*), called also MOUNTAIN SPINACH, was formerly much cultivated in England, and is still cultivated in parts of Europe as a substitute for spinach. It is a native of Tartary, an annual, with stem about three ft. high, and cordate-triangular leaves which are thick and glaucous and have slightly acid flavor. The leaves are sometimes greenish, sometimes reddish, which is the case also in other species, and the flowers resemble the leaves in color.—The leaves of the Sea O. (*A littoralis*), native of the British coasts, are used in the same manner, and those of the common garden-weeds *A. patula* and *A. angustifolia*, are excellent substitutes for spinach.—It is mentioned in Remy and Brenchley's *Journey to the Salt Lake City*, that an orach, with pale pink leaves and a salt taste, is cultivated by the Indians on the Humboldt river for its seed, which resembles that of Quinoa (q.v.) and is used like it for making porridge and bread.

Orache patula.

ORACLE, n. *ŏr'ă-kl* [F. *oracle*—from L. *orāclum* and *ra'culum*, counsel from the gods—from *oro*, I plead, I pray: It. *oracolo*]: among the *ancients*, an announcement from the gods in answer to some inquiry; a prophetic declaration; the deity who was supposed to give the answer, also the place where given (see below): any one famed for wisdom and accuracy of opinions; a sentence or decision of great authority from its wisdom. ORACLES, n. plu. *ŏr'ă-klz*, divine revelations and messages; the holy Scriptures. ORACULAR, a. *ō-răk'ū-lėr*, resembling an oracle; pretending to have the authority of an oracle; grave; venerable; ambiguous. ORAC'ULARLY, ad. *-lĭ*. ORACULOUS, a. *ō-răk'ū lŭs*, uttering oracles; resembling oracles; authoritative; ambiguous. ORAC'ULOUSNESS, n. *-nĕs*, the state of being oracular. ORAC'ULOUSLY, ad. *-lĭ*.

OR'ACLE: response of a deity or supernatural being to a worshipper or inquirer; also the deity responding; also the place of the delivery of the response. Such responses were supposed to be given by a certain divine afflatus, either through means of mankind, as in the orgasms of the Pythia, and the dreams of the worshipper in the temples; or by its effect on certain objects, as the tinkling of the caldrons at Dodona, the rustling of the sacred laurel, the murmuring of the streams; or by the actions of sacred animals, as exemplified in the Apis or sacred bull of Memphis, and the feeding of holy chickens of the Romans. This arose, in fact, from the idea that the deity signified his intentions to men by signs or inspirations, which, however, had always to be interpreted to the inquirer by the priesthood. Such responses were closely allied to augury, which differed in this respect that auguries could be taken anywhere, while the oracular spots were defined and limited. Oracle dates from the highest antiquity, and flourished in the most remote ages, and gradually declined with increasing knowledge. Among the Egyptians all temples were probably oracular, though only a few are mentioned as such by Herodotus; e.g., the oracle of Latona, in the city of Buto; those of Hercules, Mars, Thebes, and Meroe. In the hieroglyphic texts the gods speak constantly in an oracular manner, and their consultation by the Pharaohs is occasionally mentioned. In later days the most renowned of these oracles was that of Ammon, in the Oasis (q.v.), where oracular responses were rendered either by the shaking of the statue of the god, or by his appearance in a certain manner. Oracles were used by the Hebrews, also as in the consultation of the Urim and Thummim by the high priest, and the unlawful use of Teraphims, and consultations of the gods of Phœnicia and Samaria. The Hebrew oracles were by word of mouth, as the speech of God to Moses, dreams, visions, and prophetical denunciations; besides which, there were oracles of idol gods in Phœnicia, as that of Beelzebub and others of the Baalim. They were in use throughout Babylonia and Chaldæa, where the responses were delivered by dreams given to the priestesses, who slept alone in the temples as concubines of the gods. So numerous were the oracles in

the ancient world, that 300 are said to have been in operation.

The most celebrated oracles of Asia Minor were those of Telmissus in Caria or Lycia, which gave responses by dreams, and that of Apollo at Patara; but the Grecian oracles had highest reputation for truthfulness; and the most celebrated of these were the Dodonean, the Delphic, and that of Trophonius and Amphiaraus. The Dodonean (see DODONA) was the only O. in Greece given by Jupiter; the others were either those of Apollo, or of certain soothsayers, to whom that god had imparted the gift of prophecy, or of other gods. The most renowned of all was the Delphic O. (see DELPHI), and was Panhellenic or open to all Greece, consulted for public purposes, and occupying a position resembling in some respects that of the papacy in the middle ages in Europe. The name of the first priestess who gave oracles was Phemonoe. The consultations were generally in the Delphic month, *Bysios* or April, and once a day on other months; and the precedence of consulting the oracle was determined by lot, but rich presents obtained for Crœsus and the Lydians the privilege of first consultation. Sacrifices were offered by the inquirers, who walked with laurel crowns on their heads and delivered in sealed questions; the response was deemed infallible, and was usually dictated by justice, sound sense, and reason, till the growing political importance of the shrine rendered the guardians of it fearful to offend, when they framed the answers in ambiguous terms, or allowed the influence of gold and presents to corrupt the inspirations. The other oracles of Apollo were at Aba in Phocis; at Ptoon, where a man prophesied, which was destroyed in the days of Alexander the Great; and at Ismenus, s. of Thebes, Hysia, Tegyra, and Eutressis. In Asia Minor the most celebrated was that of Branchidæ, close to Miletus, celebrated in Egypt, Gryneum, and Delos. Besides that of Dodona, Zeus had another at Olympia; and those of various other deities were elsewhere. A secondary class of oracles of heroic or prophetic persons was in Greece, the two most celebrated of which were those of Amphiaraus and Trophonius. The first mentioned, one of the five great oracles in the days of Crœsus, was at Oropus, in Attica, being the shrine of a deified magician, or interpreter of dreams, having a fountain close to it. Those who consulted it, fasted a whole day, abstained from wine, sacrificed a ram to Amphiaraus, and slept on the skin in the temple, where their destiny was revealed by dreams. That of Trophonius was at Lebadea, in Bœotia, and owed its origin to a deified seer. It was given in a cave, into which the votary descended, bathed, and anointed, holding a honeyed cake. He obtained a knowledge of futurity by what he saw or heard, and returned dejected from the cavern. Then, seated upon the seat of Mnemosyne, he gave an account of what he had heard, and when conducted to the chapel of Good Fortune or Good Genius, recovered his usual composure. There were some other oracles of minor importance. Be-

sides these oracles, written ones existed of the prophecies of celebrated seers, as Bacis and Musæus, which were collected by the Pisistratidæ, and kept in the Acropolis of Athens. Those of the Euclus, Panolmus, and Lycus also were celebrated. Others of the Sibyls or prophetic women, daughters of Zeus and Lamia, were popular, and at a later period (see SIBYLS), Athenais and others, prophesied in the days of the Seleucidæ.—Among the oriental nations, as the Arabs and others, divination was and is extensively practiced, but there are no set oracles. The Celtic Druids are said to have delivered responses, and the O. of the Celtic god Belenus or Abelio, in the Isle de Sein, was celebrated. Herodot. *Hist.* v. 89, viii. 82; Curtius, iv. 7; Hare, *Ancient Greeks* (12mo, Lond. 1836, p. 141); Bos, *Antiquities of Greece* (1823, p. 31).

ORAL, a. *ō′răl* [F. *oral*—from L. *orālis;* It. *orale*, oral—from L. *os*, the mouth—gen. *oris*]: uttered by the mouth or in words; spoken, not written. ORALLY, ad. *ō′răl-lĭ*, by mouth; in words, not in writing.

ORAN, *ō-rân′* (Arab. *Waran*): thriving municipal town and seaport of Algeria, cap. of the province of O.; at the inner extremity of the Gulf of O. 220 m. w.s.w. of Algiers.—The *province* of O., sometimes called the province of the West, as forming the w. frontier of the country, is bounded n. by the Mediterranean, e. by the province of Algiers, w. by the empire of Morocco, s. by the desert; about 44,616 sq. m., of which 13,514 belong to the Tell (q.v.), and a large portion to the Sahara. Besides the commune of O., there are in the province the communes of Sidi-bel-Abbès (q.v.), of Mostaganem (pop. 13,000), of Mascara (pop. 6000), and of Tlemcen (q.v.). Pop. of province (1881) 767,322; (1891) 942,066; (1901) 1,101,354.

The *town* of O. is the seat of the govt. offices—the prefecture, the civil, criminal, commercial tribunals, etc. It contains a college, primary and native schools, Prot. and other churches; synagogues; mosques; a branch of the bank of Algeria; exchequer, post, and telegraph offices; three great barracks, St. Philippe, le Château-Neuf, and le Château-Vieux; a milit. hospital, with accommodation for 1,400 beds (an immense new building, which overtops all surrounding edifices), and various splendidly appointed magazines and govt. stores. The town, girt by walls, and defended by strongly armed forts, is at the foot of a high mountain, crowned by the forts Santa-Cruz and Saint-Gregoire. The port does not offer safe anchorage; though it has been much improved in recent years. Large vessels, however, have still to find shelter in the roadstead of Mers-el-Kebir, three m. distant. The streets and promenades of O. are generally spacious, the houses elegant and airy. The principal edifices are the Château-Neuf, residence of the gen. of division; the Hôtel de Préfecture; the great mosque de la Rue Philippe; the Rom. Cath. church; and the barracks. Pop. of commune, comprising the three suburbs, Mers-el-Kebir, La Senia, and Aïn-el-Turk (1901) 87,301. The country in the vicinity is bare and arid, though the land is not sterile. S. of the town

the country is uncultivated; but toward the s. e., highly cultivated lands are seen. In the vicinity are many farms under the highest culture, most of them well furnished with buildings. Cattle are reared, and grain, tobacco, and cotton are grown. The vine already covers large tracts and its cultivation is annually extending. The wines are of good quality.

The *town* of O. was built by the Moors. It was taken by the Spaniards 1509, by the Turks 1708, again by the Spaniards 1732. It was destroyed by an earthquake 1791, and shortly afterward it was altogether abandoned by the Spaniards. O. was taken by the French 1831, has since remained in their hands, and has by them been developed into a large and prosperous town. Vessels with aggregate tonnage of 65,000 tons enter and clear the port yearly. The annual imports amount to about $6,355,422, and the exports to $1,268,411. A bishopric was established at O. 1867. Pop. of town (1881) 58,530; commune (town and suburbs) 59,377. In 1876 about one-fourth of the pop. was French. Pop. (1891) 73,839.

ORANG, n. *ō răng'*, or ORANG-OUTANG, n. *ō-răng'ū-tăng* [Mal. *orang-utan*, meaning wild man of the woods—from *orang*, man; *utan*, a wood], (*Simia satyrus*, or *Pithecus satyrus*, or *P. Abelii*): species of ape in the forests of Malacca, Conchin-China, and some islands of that part of the world; approaching in appearance the human form. The name is sometimes extended to include all the species of the restricted genus *Simia* or *Pithecus*, a genus which exists only in s.e. Asia and the Eastern Archipelago; and it was also till of late extended even to the African apes now forming the genus *Troglodytes*, the species which is the subject of this article being distinctively called the RED O., when it and the Chimpanzee were the only *anthropoid* apes known. The genus *Simia* or *Pithecus* differs from *Troglodytes* (the Chimpanzee and Gorilla) in the more lengthened muzzle—the lower part of the face projecting suddenly and remarkably; in the very large canine teeth; in the great breadth of the central incisors; and in the great length of the arms, which are so long that the fingers can touch the ground when the animal stands erect. The ears are small, and close to the head. The eyes are close together; the nose is little elevated; the lips are scarcely visible when the mouth is shut. The apes of this genus are arboreal in their habits, and not gregarious. They are ill adapted for walking on the ground, and in a wild state probably almost never assume an erect posture, and though they can be taught to do it in confinement, they maintain it with difficulty, and only when standing still; even then often seeking to adjust the balance of the body by raising the arms above and behind the head. In climbing and swinging among the branches of trees, the hands of the hinder extremities are used as readily as those of the anterior, and the great length of the arms is useful in enabling them to take hold of distant branches. The fingers of all the extremities are very long.

For some of the most important distinctions between the

anatomy of the anthropoid apes and that of man, see CHIMPANZEE. The O. and its congeners are regarded as differing more widely from man in their anatomical characters than the chimpanzee and gorilla; though the number of ribs is the same as in man, and there are a few other particulars in which the O. more nearly resembles a human being than any of the African apes. The projecting muzzle is much less notable in the young than in the adult O., and the aspect of the adult males is further rendered hideous by great callosities on the cheeks. In the adult state, the ridges of the skull also greatly increase in thickness and prominence.

Orang-Outang (*Simia satyrus*).

The species of this genus exhibit in much greater degree than those of *Troglodytes* an anatomical character common to many other apes and monkeys, a pouch in the throat, opening from the windpipe, and capable of being dilated with air at the pleasure of the animal. In the O., it branches into several subordinate pouches among the muscles of the throat. The use of this organ is not known. It does not appear to have any connection with the voice; and has been supposed, not very probably, to be of some service in leaping, by diminishing the specific gravity of the animal.

There are at least two other species of the genus besides that best known as the O., one of these being the great Pongo (q.v.) of Borneo (*S.* or *P. Wormbii*), and the other (*S.* or *P. morio*), also native of Borneo, of comparatively small size. The nat. history of these apes has not been thoroughly investigated; and, until recently, it was supposed that the species first known might be identical with the great ape believed to exist in the woods, and that the differences of size and other characters might depend

merely on age. The O. is about three ft. in length from the heel to the crown of the head. It is covered with brownish-red hair, which, on the back and arms, is five or six inches long, but very short on the backs of the hands and feet. There is little hair on the face, and none on the palms of the hands. When taken young, it is easily tamed, and becomes familiar. It has considerable sagacity, and some playfulness and love of mischief, but is not so frolicsome as many of the monkey tribe. Young specimens have sometimes been brought to Europe, but none have lived long.

ORANGE, n. *ŏr'ĕnj* [It. *arancio;* Sp. *naranja,* an orange—from Ar. *naranj,* an orange: mid. L. *arangia,* an orange, which passed into OF. *orenge;* F. *orange,* under the influence of the color of the fruit]: name of a tree, a species of citrus, and its fruit (see below): ADJ. pertaining to or resembling the color of an orange. ORANGE-COLORED, a. of the color of an orange (see ORANGE COLORS). ORANGE-TAWNY, a brownish orange color. ORANGEADE, n. *ŏr'ĕnj-ād',* a drink made with orange-juice. ORANGE-MUSK, a species of pear. ORANGE-PEEL, the rind or skin of an orange. ORANGEMEN, n. plu. *ŏr'ĕnj-mĕn,* famous political association of Protestant Irishmen—so called from William, Prince of Orange, who became William III. (see ORANGEMAN). ORANGEAT, n. *ŏr'ăn-zhăt* [F.—from *orange*]: candied orange-peel. ORANGERY, n. *ŏr'ĕnj-ér-ĭ,* a house where oranges are reared artificially; a plantation of orange-trees. *Note.*—The proper spelling of ORANGE is *norange,* and in F. the spelling should be *narange,* but the word was early corrupted to *orange*—from F. *or;* mid. L. *orum,* gold, this being the color of the fruit.

ORANGE, *ŏr'ĕnj:* city in Essex co., N. J.; on the Delaware, Lackawanna and Western and the Erie railroads; 13½ m. w. of New York, 3½ m. n. of Newark. It is on a series of ridges that rise gradually from a level of 150 ft. above tide-water and terminate in the Orange Mountains, more than 600 ft. above tide-water. O. and its suburbs, E. O., W. O., and S. O., are noted alike for healthfulness and beauty of location, and each has been improved and built up chiefly by New York business men who have made their homes here. The attractions of the vicinity are numerous and popular, and include excellent drives along and across the two ridges of mountains; the magnificent Llewellyn Park, which extends from the base to the summit of the mountain, includes nearly 1,000 acres of field, mountain, and woodland, and contains many beautiful residences; Eagle Rock, at the summit of the mountain, from which is presented a grand view of the country for many miles and of the cities of New York and Brooklyn, and a water panorama as far as the New York 'Narrows,' and historic Hutton Park. O. was settled in 1666 by a colony from Connecticut. It formed part of Newark and was called 'Newark Moun-

tain.' Evolution in name and condition were brought about by causes chiefly religious, O. being a presbyterian stronghold. In 1806 O. was incorporated. South O. dates from 1861; West O. from 1862; East O. from 1863.

The industries of O. now include hats, printing-plants and the Edison specialties. The Edison factories employ, usually, about 5,000 people. There are numerous large public and other buildings, including the Metropolitan building, Music Hall, Masonic Temple, House of the Good Shepherd, O. Memorial Hospital, Stickler Memorial Library, and Seton Hall College. O. Training School for Nurses is one of the special features of the municipality. There is a Mendelssohn Union at O., also the New England Society and a Bureau of Associated Charities. There are several national and savings banks and more than 20 places of worship, every one of the leading denominations being represented. Several of the churches and other buildings at O. are strikingly handsome in appearance. For many years 'The Oranges,' as they are called, have been considered especially desirable for residential purposes. Pop. (1910) 29,630.

ORANGE, *o-rŏngzh'* (anc. *Arausio*): ill-built, decaying, and dirty, but also interesting town of France, dept. of Vaucluse, in a plain on the left bank of the Aigue, 16 m. by railway n. of Avignon. Pop. 6,000. Its chief manufactures are silks, muslins, serges, etc.; and there are numerous oil-works, dye-works, and tanneries. It has considerable trade in wine, spirits, oils, truffles, saffron, honey, madder, and essence.

O. was cap. of the small independent principality of O. (now comprised in the dept. of Vaucluse), which was ruled by its own sovereigns from the 11th to the 16th c. The last of these sovereigns, Philibert de Chalons, died 1531, without issue. His sister, however, had married a Count of Nassau, and to that house the estates and titles passed. The Count of Nassau who obtained the principality of O. was William, father of William I., the Stadtholder of the United Provinces (see WILLIAM, PRINCE OF O.). William III., Prince of Orange and King of England, having died 1702 without issue, there began a long controversy as to the succession between Frederick I. of Prussia (as grandson of one of the last princes of O.), representative of the older branch of the House of Nassau (q.v.), and the head of the younger line. At the peace of Utrecht (1713) the King of Prussia took the settlement into his own hands, so far as the territory of O. was concerned, by making it over, for certain equivalents, to the King of France. The title, Prince of O., remained with the younger Nassau line, afterward kings of the Netherlands, and is now borne by the heir-presumptive to the Dutch throne.

OR'ANGE: name of one or more species of *Citrus* (q.v.), a tree whose fruit is much prized. Botanists generally regard all the oranges as of one species, *Citrus aurantium*, but some follow Risso in making the Sweet O., the Bitter O., the Bergamot O., etc., distinct species. The wild state of the O. is not certainly known, though its characters may be with some confidence inferred from the degeneration of cultivated varieties; and no cultivated plant shows greater liability to degenerate, so that seedling oranges are almost always worthless. Its native country is not known, though there is reason to believe that all the kinds have spread from the warmer central and e. parts of Asia. It has been alleged that the O. is a native of N. America, near the Gulf of Mexico; but the probability is that it was introduced and has become naturalized there.

The COMMON O., or SWEET O. (*Citrus aurantium* of Risso), is an evergreen tree of moderate size, with greenish-brown bark; leaves oblong, acute, sometimes minutely serrated, leaf-stalks more or less winged, flowers white, fruit roundish, oil-cysts of the rind convex, juice sweet and acid. It is cultivated in almost every part of the world of which the climate is warm enough, but thrives best in the warmer, temperate, or sub-tropical climates, as in s. Europe, where it is extensively cultivated as far n. as s. France. The O. seems to have been unknown to the Greeks or Romans, but was probably brought to Europe by the Moors, and is supposed to have been introduced into Italy so recently as the 14th c., fully 1,000 years after the citron. In n. Italy, oranges are sometimes grown in conservatories, but often in the open air, except during winter, when they are covered with temporary houses of boards. In s. England, they are sometimes in like manner grown in the open air, with a shelter of boards or matting in winter, but trained against a south wall; attaining large size, and yielding good fruit; but they are thus cultivated merely as objects of interest. In former times, when the evergreen shrubs in cultivation were much fewer than now, O. trees were more frequently cultivated in pots, in green-houses and in windows in the more northern temperate countries, as is still the case in n. Germany. The O. loves rich soil; and has been said to thrive in a strong clay, though American growers deny this. There are many varieties in cultivation in different countries, perpetuated by grafting upon seedling O. stocks, and by layers. In this country, budding is one of the leading methods of propagating the O.—probably used more extensively than grafting and layering combined.

Of varieties of Sweet O., perhaps the most deserving of notice are the PORTUGAL or LISBON O., most common of all, having the fruit generally round or nearly so, and a thick rind; the CHINA O., said to have been brought by the Portuguese from China, now much cultivated in s. Europe, having a smooth thin rind and very abundant juice; the MALTESE or BLOOD O., remarkable for the blood-red color of its pulp, the EGG O., having fruit of an oval shape; and the TANGERINE O., having a small flat

THE ORANGE.

fruit, with extremely aromatic odor and mildly flavored pulp, not abundant in juice. There are two varieties; the smaller hardly an inch in diameter, with sweet flesh and deliciously fragrant rind; the larger about half the size of the common O.: the smaller is rarely seen in this country. The St. Michael's O. appears a sub-variety of the China Orange. The Majorca O. is seedless, like certain cultivated varieties of other fruits.

The Bitter O., Seville O., or Bigarade (*Citrus vulgaris*, or *C. bigaradia*), is distinguished from the Sweet O. by the more truly elliptical leaves, the acid and bitter juice of the fruit, and the concave oil-cysts of its rind. Also its branches are spiny, which is rare with the Sweet Orange. The varieties in cultivation are numerous. The Bitter O. was extensively cultivated, probably for medicinal purposes, by the Moors in Spain, especially around Seville (whence its name). The rind is more bitter than that of the Sweet O., and is used as a stomachic and tonic. Its chief use, however, is for flavoring puddings, cakes, etc., and for the confection called O. marmalade.

For the Bergamot O. (*C. Bergamia*), see that title.

The Mandarin O., or Clove O. (*C. nobilis*), recently introduced from China, has fruit much broader than long, with a thick rind, very loosely attached to the flesh, so that there is often a space between them. The leaves are smaller than those of any other kind of orange.

The Navel O. from Brazil is nearly double the size of the ordinary O., and has a peculiar navel-like formation on the top of its somewhat oval fruit.

O. leaves are feebly bitter, and contain a fragrant volatile oil, obtained by distilling them with water, and known in the shops as *Essence de Petit Grain*. O. flowers yield, when distilled with water, a fragrant volatile oil, called *Oil of Neroli*, used in making *Eau de Cologne*, and for other purposes of perfumery. The flowers both of the Sweet O. and of the Bitter O. yield it, but those of the Bitter O. are preferred. Dried O. flowers, to be distilled for this oil, are an article of export from s. Europe. They are packed in barrels, and mixed with salt. The dried flowers have a yellowish color; the fresh flowers are white and very fragrant. The use of them as an ornament in the head-dress of brides is common throughout great part of the world.—The small green oranges, from the size of a pea to the size of a cherry, which fall from the trees, both of the Sweet O. and the Bitter O., when the crop is too great to be brought to maturity, are carefully gathered and dried, and are the *O. berries* of the shops. They are used in making Curaçoa, and they yield a fragrant oil on distillation, the original *essence de petit grain;* and they are smoothed in a turning-lathe, and employed in surgery as *issue pease;* not readily acquiring a fetid odor, as pease do when employed for this purpose.—The dried and candied rind of the ripe Bitter O., well known as *Orange-peel*, is used as a stomachic, and for flavoring puddings and confectionery. The rind of the Sweet O. sometimes employed in the same way, is inferior. A fragrant essential oil is obtained from the

rind of the O. by distillation with water, and is sold by perfumers as *Oil of Sweet O.*, or *Oil of Bitter O;* the two kinds are very similar. The rind of the O. is used in preparation of a fine liqueur, *O. Rosoglio*, an article of export from parts of Italy. The juice of the Sweet O. is valuable in febrile diseases.

O. trees are often extremely fruitful, so that a tree 20 ft. high, occupying a space little more than 12 ft. diameter, sometimes yields 3,000 to 4,000 oranges in a year. The tree attains an age of 100 to 150 years, perhaps more. The wood is yellowish white and close grained: it is used for inlaying and for turnery.

The fruit of the O. tree is of great commercial importance; as no fresh fruit has in the same degree as the O., and its congeners, the lemon, citron, lime, etc, the property of being easily packed in boxes, when nearly ripe, and in that state enduring the close confinement of a ship's hold during a voyage of two or three weeks.

The oranges of commerce are furnished generally by the Azores, Cuba, Malta, Sicily, and Spain; but in recent years the states of Cal. and Fla., having developed their groves, have become strong competitors. The American market is largely supplied by these states, but the occasional damaging of the crops by dangerous frosts has helped to increase the importations of the fruit. The orange product of Fla., 1894, was placed at 4,000,000 boxes, and that of Cal. at 2,400,000 boxes. There are from 120 to 150 oranges in a box.

In a favorable climate the O. thrives on a wide variety of soils from high pine barrens to a low moist field, but not in heavy clay. Frosts are injurious, and if severe may prove fatal to the trees. Where light frosts are likely to occur sheltered locations for the trees should be selected. Trees may be started from the seed or obtained from a wild grove or a nursery. When grown from seed the quality of the fruit is likely to degenerate. Budding on wild stocks not only keeps the variety pure but gives more hardy trees than are produced from seed of the sweet sorts. Budding also induces early bearing. Wild groves are sometimes thinned and the remaining trees budded or grafted. When a grove is to be started the land should be plowed and the young trees set in rows about 30 ft, apart each way. This will give 48 trees per acre. Much closer setting (20 ft. apart and giving over 100 trees per acre, is sometimes practiced, but when grown the trees do not have sufficient room. While the trees are small vegetable crops may be grown among them but these crops should be freely manured. The budded trees may be taken from the nursery when four years old. If well cared for they should yield fruit in four or five years after setting, and become quite productive in 10 or 15 years. Annual crops may be expected but in some seasons the yield will be greater than in others. From 2,000 to 5,000 oranges per tree may be considered a good yield but some old trees produce 10,000 oranges each. The roots of the trees grow near the surface; consequently cultivation should be shallow. Fertilizer, of any standard

kind, lightly worked into the soil will be highly beneficial. Insect enemies should be kept down by the use of a kerosene emulsion, or other insecticide, and by clean cultivation. The bearing season in this country extends, for the main crop, from Nov. to Feb. in La., Dec. to March in Fla., Feb. to May in Cal. Besides several varieties of the Mandarin O., of which the King and the Satsuma are leading kinds, and a few varieties of the Tangerine O., there are a large number of sorts of the sweet O. Among popular kinds are the Cunningham, Exquisite, Foster, Jaffa, Mediterranean Sweet; Tardiff, known also as Hart's Late; Washington Navel, also known as Bahia, and Riverside Navel, and Whitaker. Some of these varieties are native seedlings; others were introduced from foreign countries by the national govt., nurserymen, or fruit-growers. The quality is greatly dependent on climate. Very mild-flavored sorts become worthless in Fla., and the acid kinds become too sour when grown in Cal.

Oranges, gathered for export, must not be quite ripe; those fully formed, and with color just turning from green to yellow, are chosen. Each is wrapped in a piece of paper, or in the husk of Indian corn, and they are packed in boxes and half-boxes, chests and half-chests. *Orange-peel* for confectionery is carefully separated, either in halves or quarters, from the fruit and after lying in salt-water for a time, is washed in clear water, and then boiled in syrup of sugar, or candied. The rinds of the citron and lemon are treated in the same manner.

ORANGE COLORS, for Painters' Use: various shades of alteration produced on chrome yellow (see YELLOW), by acting on it either with diacetate of lead or a weak alkaline lye, both of which redden the otherwise pure yellow, and give it an orange tint. For dyers a beautiful orange red is obtained from safflower; and orange yellows are made by mixing, in proper proportions, any of the red with the yellow dies.

ORANGEMEN: unhappy party designation which for more than a century has contributed to keep alive religious and political divisions of the worst character in the British empire, especially in Ireland. The Orange organization had its origin in the animosities which had subsisted between Protestants and Rom. Catholics in Ireland since the Reformation, but which reached their full development after the Revolution of 1688, and the wholesale confiscations of Rom. Cath. property by which that event was followed. From that time the Rom. Catholics of Ireland may be said legally to have lost social, political, and religious status in their own country. Some attempts in the latter part of the 18th c. to ameliorate their condition, excited, especially in the north, the alarm of the Prot. party, who regarded the traditionary 'Protestant ascendency' as endangered. Acts of violence became frequent, and, as commonly happens, combinations for aggressive and defensive purposes were formed by both parties. The members of the Prot. associations appear at first to have been known by the name of 'Peep-of-day Boys,' from the time at which their violences

were commonly perpetrated; the Rom. Catholics who associated together for self-defense being called 'Defenders.' Collisions between armed bodies of these parties were frequent. In 1785, a pitched battle, attended with much bloodshed, was fought in the county of Armagh. Attempts at repression of open violence were inefficient, yet had the effect of diverting the current into the more dangerous channel of secret associations. The rude and illiterate mob of Peep-of-day Boys made way for the rich and influential organization of the Orange Society, which by degrees extended its ramifications into every portion of the British empire, and into every grade of society from the hovel to the very steps of the throne. It was named from the Prince of Orange, William III. (q.v.), who, in Ireland, has been popularly identified with the establishment of the Protestant ascendency. The first 'Orange Lodge' was founded in the village of Loughgall, county Armagh, 1795, Sep. 21. It was a region and time of outrage, 12 or 14 houses of Rom. Catholics being sometimes, according to a disinterested witness, wrecked in a single night. The assoc. which began among the ignorant peasantry soon worked its way upward. The general disaffection toward English rule, which at that time pervaded Ireland, and in which the Rom. Catholics, as a natural consequence of their oppressed condition, largely participated, tended much to identify in the mind of Protestants disloyalty with popery: and the rebellion of 1798 inseparably combined the religious with the political antipathies. In Nov. of that year, the Orange Society had already reached the dignity of a grand lodge of Ireland with a grand master, a grand secretary, and a formal establishment in the metropolis; and in the following years, the organization extended over the entire province of Ulster and had its ramifications in all the centres of Protestantism in the other provinces of Ireland. In 1808, it extended to England. A grand lodge was founded at Manchester, from which warrants were issued for the entire kingdom: its seat was transferred to London 1821. Memorable in the history of the Orange Soc. was the election of a royal duke (Cumberland) 1827 as grand master for England, and 1828 as imperial grand master. The Rom. Cath. Relief Act of the following year stirred up all antipathies of creed and race, and emissaries were sent out to organize lodges in Wales, Scotland, Canada, the Mediterranean region, and in the other colonies. A formidable part of this zealous propagandism was its introduction into the army, discoverable 1824 and 26. No fewer than 32 regts. were proved to have received warrants for holding lodges in Ireland, and the English grand lodge had issued 37 warrants for the same purpose.

The organization was complete and extensive. The only condition of membership was, that the applicant should be Prot., and 18 years of age. In 1835, the association numbered 20 grand lodges, 80 district lodges, 1,500 private lodges, and 200,000 to 220,000 members. Its worst effect was its supply of a constant incentive to party animosities and deeds of violence. The spirit of fraternity which per-

vaded its members was a standing obstacle to the administration of the law; and confidence in the local administration of justice by magistrates was destroyed. An alleged Orange conspiracy to alter the succession to the crown in favor of the Duke of Cumberland, led to a protracted parliamentary inquiry 1835; and this inquiry, as well as a shocking outrage by an armed body of Orangemen, on occasion of a procession in Ireland, so discredited the association, that its respectability has since gradually diminished. For several years the lord chancellor laid down a rule, by which no member of the Orange Assoc. was admitted to the commission of the peace; and the association became comparatively without influence, except among the very lowest classes in n. Ireland. Of the colonial offshoots of the Orange Assoc., those of Canada have at all times been most active, and outrages against Rom. Cath. churches and convents were frequent until recent years; and on occasion of the visit of the Prince of Wales to Canada, an attempt was made to force from his royal highness a recognition of the assoc., which was defeated by his own firmness, and by the judicious counsels of his advisers. A few years ago the Orangemen of British America constituted above 1,200 lodges, with about 150,000 members. The assoc. has branches in the United States also.

The Orange Assoc. in Ireland which had begun to fall into general disrepute, received an impulse among the working-classes from a series of sanguinary conflicts with Rom. Catholics on occasion of the anniversary celebrations of the society; and even still, the peace of many districts in n. Ireland is preserved on such occasions only by the presence of an overpowering force of military and constabulary. The repeal of the Processions Act has failed, till the present time, to put an end to the traditional collisions of the parties.

OR'ANGE RIV'ER, South Africa: see GARIEP.

OR'ANGE RIVER FREE STATE: name assumed by the republic of Dutch boers, who, after retiring from Natal when it was declared a British colony, established themselves in the country between the two great branches of the Orange river, the Ky Gariep and the Gariep, known to the colonists as the Vaal and Orange rivers, and separated from the coast region by the great chain of the Quathlamba, Maluti, and Drachenberg mountains. The area is 41,500 sq. m. The state is a sort of connecting-link between the Cape Colony, the Transvaal, and Natal. It consists chiefly of vast undulating plains, which slope down from the Maluti Mountains to the Vaal river, dotted over with rocky hills, called 'Kopjies;' but in the n., hundreds of sq. m. have scarcely a break on the horizon. When the emigrant Dutch boers took possession of this country, it was inhabited by different tribes of Betjouanas and Corannas, all of whom have been dispersed or subdued, including the powerful Basuto tribe, under the late chief Moshesh. The country is very rich in minerals: precious stones occur; coal is found everywhere, and iron, tin, copper, and lead are plentiful; besides plumbago,

alum, saltpetre, ochre, and useful earths. All the rivers of this region are affluents of either of the branches of the Gariep; among them are the Modder, Valsch, Great and Little Vet, which run into the Ky Gariep or Vaal river, and the Caledon, a considerable stream, which joins the Orange river after draining the Basutu country. This region is a vast plateau, rising 3,000 to 5,000 ft. above sea-level, with very little wood, except along the water-courses. Travellers crossing this state from the Cape Colony to Natal arrive at the top of the passes leading to the latter colony without a mountain being in sight, and then find themselves suddenly on the edge of an immense mountain-chain, with the coast region several thousand ft. below them, extending to the Indian Ocean. Immense herds of the larger antelopes formerly tenanted these vast plains, and are vividly described by Captain Harris, Gordon Cumming, and others; they are now fast disappearing. The diamond-fields recently discovered lie partly in this state, partly in Griqualand West, now British territory.

The land in the Free State is very fertile. The difference of temperature in various parts of it renders it possible to raise tropical and sub-tropical products, coffee, sugar, rice, and cotton, in some parts; while hemp, flax, and the vegetables of n. latitudes grow freely elsewhere. Tobacco and maize are largely cultivated, and fruits can be had all the year round. The climate of the state is very healthful; and that of the uplands, considering the latitude, is wonderfully cool. The houses of most of the inhabitants are little more than strongly built mud huts, very sparely furnished.

The cap., Bloemfontein, is the only considerable town, and contained (1903) 6,000 inhabitants. The other vill. or small towns are on the increase. The Dutch Reformed Church has about 20 congregations; the Anglican, Wesleyan, Lutheran, and Rom. Cath. Churches also are represented. There are 13 administrative districts in the state. The public income 1879–80 was stated at $520,379, the expenditure at $508,934.

The country forming the Orange River Free State was described by Capt. Harris before 1836, as a howling wilderness, inhabited by wandering hordes of Bushmen and broken tribes of Betjouana and Zulu refugees from the armies of the great Zulu tyrants, Chaka, Dingaan, and Maselikutse. After the Kafir war of 1835–6, dissatisfaction arose in the minds of many of the frontier boers, and an extensive emigration took place along the n.e. frontier of the Cape Colony; the majority of the emigrants having Natal as their ultimate goal. However, after the British govt. had declared Natal an English colony 1843, the boers again fell back on this region, and by degrees declaring their independence of the British crown, and forming a sort of Alsatia on the borders of Natal after some opposition, and one or two conflicts with British troops, the country was annexed by Sir H. Smith to the British empire, under the name Orange River Sovereignty; and continued so until 1854, when Sir G. Clerk formally

gave it up, and allowed the inhabitants to form a govt. according to their own wishes. The discovery of diamonds on the Vaal river in 1870 led to conflicting claims by the Orange River Free State and the Transvaal Republic, but in 1871, Oct., the British annexed the disputed territory. In 1899 the Orange River Free State participated in the Boer attack on the adjacent British colonies; in 1890, May 24, it was annexed to the British crown, and is now known as the Orange River Colony. Resistance continued, however, until 1902, May 31, when the rep. of the burghers in arms acknowledged the sov. of King Edward. There is a gov. over the Transvaal and Orange river colonies, and under him a lieut. gov. for the Orange River Colony.

About 1862, a large number of Griquas—a tribe of Bastard Hottentots, who inhabited the s. part of the state—sold their farms to the Free State govt., and migrated in a body to the coast side of the mountains in Independent Kaffraria, occupying a large tract of country there known by the name of No Man's Land.

The Dutch boers profess the Dutch Reformed faith, and speak a dialect of Dutch, corrupted with Hottentot and English words. They marry young, and keep up, to some extent, nomadic habits. The roads and internal communication are good. Lime and timber are rather scarce, but building stone and thatch abundant. Wooled sheep have increased amazingly in the last few years; and farms that ten years ago would hardly fetch $250, now sell at $10,000 to $15,000. The value of imports is about $2,500,000 a year; of exports, $5,000,000. Pop. at the first census (1880) 133,518, ; (1890) 207,503.

ORARIUM, n. *ō-rā'rĭ-ŭm* [L.]: a scarf worn by the classic nations to wave in the circus on triumphal occasions; also a napkin for the same use as a modern pocket-handkerchief: in *eccles.*, a scarf sometimes twined round the handle of the mediæval crosier; also the scarf or stole of a priest, or the border or hemming of a robe.

ORATION, n. *ō-rā'shŭn* [OF. *oration*—from L. *oratĭōnem*, speech, eloquence—from *oro*, I plead, I beseech: It. *orazione:* F. *oraïson*]: a speech or discourse delivered in public on a special occasion; a harangue; a declamation ORATOR, n. *ŏr'ă-tẽr* [F. *orateur*—from L. *oratōrem*]: an eloquent public speaker. ORATORICAL, a. *ŏr'ă-tŏr'ĭ-kăl*, or OR'ATO'RIAL, a. *-tō'rĭ-ăl*, pertaining to oratory; becoming an orator. OR'ATOR'ICALLY, ad. *-lĭ*, or OR'ATO'RIALLY, ad. *-lĭ*. ORATORY, n. *ŏr'ă-tẽr-ĭ* [L. *oratoria*, oratory]: the art of speaking in public in a pleasing and effective style; an exercise of eloquence (see ELOQUENCE: RHETORIC).—SYN. of 'oration': address; speech; lecture; sermon.

ORATIONES: see note under PRECES.

ORATORIANS, *ŏr-a-tō'rĭ-anz:* members of the Congregation of the Oratory: see NERI, PHILIP DE.

ORATORIO, n. *ŏr'ă-tō'rĭ-ō* [It. *oratorio*, an oratorio—from It. *oratorio*, chapel or oratory, the place where these compositions were first performed]: long sacred musical composition, either purely dramatic or partaking both of the drama and the epic, in which the text is illustrative of some religious subject, sometimes taken directly from Scripture; and the music consists of recitatives, airs, duets, trios, quartets, choruses, accompanied by an orchestra, sometimes also by an organ and introduced by an instrumental overture. The O. is not intended for scenic representation.

St. Filippo Neri, b. 1515, has been considered the founder of the O. He engaged poets and composers to produce dialogues, on subjects from scriptural and legendary history, in verse and set to music, which were performed in his chapel or oratory on Sundays and church festivals. The subjects were *Job and his Friends*, *The Prodigal Son*, *The Angel Gabriel with the Virgin*, and *The Mystery of the Incarnation*. Stradella composed various oratorios, of which *San Giovanni Battista*, produced 1670, is praised by Dr. Burney. A number of oratorios, or *azioni sacre*, by Apostolo Zeno and Metastasio, were set to music by Caldara in the beginning of the 18th c. Sebastian Bach's *Passions-Musik* was a species of O., originally performed during the service of the church, the congregation joining in the chorales. Its form arose out of the practic in the Lutheran Church, of having the gospels for the day repeated on Good Friday, and some other festivals, by different persons in a recitative and dialogue style. By far the greatest master of O. was Handel, who perfected that species of composition, and was the first to introduce it into England. At the age of 20 when on a visit to Italy, he produced his O. *La Resurrezione* at Rome. *Esther*, the first O. written by him in England, was composed for the chapel of his patron, the Duke of Chandos, 1720, the words altered from Racine. It was performed privately at Cannons in the same year, but laid aside, and not produced in public till 1732. An O. was then so complete a novelty in England, that it was deemed necessary to give the following explanation in advertising it: 'By His Majesty's command, at the King's Theatre in the Haymarket, on Tuesday the 2d May, will be performed the sacred Story of Esther, an oratorio in English, composed by Mr. Handel, and to be performed by a great number of voices and instruments.—*N. B.* There will be no acting on the stage, but the house will be fitted up in a decent manner for the audience.' For many years after the appearance of *Esther*, no more oratorios were produced by Handel, who applied himself to operas and other secular music; and it was only after the temporary failure of his health, that at the age of 53 he turned again to O. The great oratories which have made his name immortal all were produced in the decline of life, some of them after he was afflicted with blindness, and they were performed mostly in the Old Haymarket Theatre. *Deborah* was performed first 1733; *Athaliah*, 1734; *Israel in Egypt*,

1738; *The Messiah*, 1741; *Samson*, 1742; *Judas Maccabæus*, 1746; *Joshua*, 1747; *Solomon*, 1749; *Jephtha*, 1751. The two crowning works were *Israel in Egypt* and *The Messiah*—the former ranks highest of all compositions of the oratorio class. *The Messiah*—which, because its text was entirely from Scripture, was called by Handel *The Sacred Oratorio*—ranks very near it in musical merit, and has attained a more universal popularity; from the time when it was first brought out, to the present day, it has been performed for the benefit of nearly every important charitable institution in Britain, and has been produced in the United States on many recurring anniversaries. *Judas Maccabæus* is perhaps best known from the flowing and martial grace of that unrivalled military march, 'See the Conquering Hero Comes;' and *Saul* is associated in every one's mind with the most solemn of all funeral marches. The orchestra was but imperfectly developed in Handel's time, and his oratorios had therefore originally but meagre instrumental accompaniments; they have since been generally performed with additional accompaniments written by Mozart. From Handel's time onward, it was the custom in London to have oratorios performed twice a week during Lent in the various theatres; this custom continued till the institution of the O. performances at Exeter Hall. Haydn composed three oratorios—*The Return of Tobias*, *The Seven Last Words*, and *The Creation*. *The Seven Last Words*, a work full of sweetness and of energy, hardly answers to the common conditions of an O.; it is rather a series of symphonies, intended to follow as many short sermons on the sentences uttered by our Lord on the cross, the text being a subsequent addition by the composer's brother, Michael Haydn. *The Creation* originated in a visit of Haydn to London 1791, when he heard for the first time some of the works of Handel, none of which were then known in Germany. Though less grand than the oratorios of Handel, it is full of fresh lovely songs, bright choruses, picturesque recitatives, and exquisite instrumentation. Beethoven's sole O., *The Mount of Olives*, is a pure drama rather than the mixed composition generally known under the name. Spohr's *Last Judgment*, produced 1825, contains some grand music, particularly in the choruses. Costa's *Eli* deserves mention among modern oratorios. But since the time of Handel no other writer of oratorios has approached Mendelssohn, whose greatest works are his *St. Paul* and *Elijah;* the former produced first at Düsseldorf 1836, the latter at Birmingham 1846. At his death he was engaged in a third O., called *Christus*, which he expected would be his greatest, and of which but a few fragments have been published. Mendelssohn greatly promoted the O. in Britain. Gounod's O., *The Redemption*, produced first at Birmingham 1882, he regards as his masterpiece. At Exeter Hall in London, and throughout England, oratorios are performed on a large scale, and with a power, a precision, and a perfection unknown elsewhere. The choruses at the provincial festivals are mostly supplied by Birming

ham, Manchester, Leeds, and other large towns. The greatest O. performances are now those of the Triennial Festivals at the Sydenham Crystal Palace. At the festival of 1880, the chorus amounted to 2,900 voices, and there was an orchestra of 425 performers.

The first performance of O. in the United States was 1770, in Trinity Church, New York; but the first entire O. in New York was not till 1831—in both instances Handel's *Messiah*. The Handel and Haydn Soc. of Boston was formed 1815, and its first O. was in that year—Haydn's *Creation*, Part I. Selections from oratorios had been brought out often in concerts before that time, and the *Creation* entire was produced by the Handel and Haydn Soc. in King's Chapel, Boston, 1816. In 1821, the same O. was executed by the Baltimore Harmonic Soc. The New York Sacred Music Soc. from 1831 continued to give yearly oratorios. In 1837, the Boston Musical Institute, and the Acad. of Music there, began to render this class of works; 1844, the New York Musical Institute; 1849, three New York societies were fused into the Harmonic Soc. for the same purpose. In 1857, a new impulse was given by the first triennial musical festival of the Handel and Haydn Soc. of Boston, when three oratorios were produced. From 1863 onward, members of the New York Harmonic and other societies, including the Mendelssohn formed that year—but, most prominently, the New York Oratorio Soc. instituted under Dr. Damrosch 1873—have rendered the *Messiah* in Christmas week. Outside of these musical centres there have been many societies, with occasional O. performances—most systematically by the Worcester County Mus. Assoc., Mass., formed 1863. In the west, the German societies rarely present sacred music; it is left to the 'psalm-singing' American associations.

Among the composers of oratorios in the United States, more or less successful, are John K. Paine, author of *St. Peter*, 1872; J. Eliot Trowbridge, *Immanuel*, 1886; George Bristow, *Hymn of Praise;* Max Vogrich, *The Captivity*, 1890; and authors of sacred cantatas or 'short oratorios' such as *Belshazzar*, by J. A. Butterfield; *Belshazzar's Feast*, George F. Root, 1860, and his *Faith Triumphant*, 1886; *Esther*, Wm. B. Bradbury, 1874; *Daniel*, Root and Bradbury; *Fourth Psalm*, Dudley Buck; *Forty-sixth Psalm*, W. W. Gilchrist; *Biblical Cantata*, L. Damrosch, and his *Ruth and Naomi; Boaz*, Andrews; *Third Psalm*, J. E. Trowbridge; *Redemption Hymn*, J. C. D. Parker; *Praise to God*, G. Bristow; *Juvenile Oratorios*, J. C. Johnson; *Joseph in Bondage*, Chadwick; and *A Supplication*, P. F. Campiglio.

The cultivation of the O. in America is well illustrated by the wide range of performances of the Handel and Haydn Soc. of Boston—the largest and (the Stoughton Soc. excepted) the oldest existing organization in this country devoted to sacred music. Following its production of Haydn's *Creation* entire, 1816, may be mentioned Beethoven's *Mount of Olives*, 1833; Spohr's *Last Judgment*, 1842; Mendelssohn's *St. Paul*, 1843; *Samson*, and *Moses in*

Egypt, 1845; *Judas*, 1847; *Elijah*, 1848; *Solomon*, 1855; Costa's *Eli*, 1857; *Israel*, 1859; *St. Cecilia*, 1863; *Jephthah*, 1867; *Naaman*, 1869; *Woman of Samaria*, 1871; *Christus*, and Bach's *Passion*, 1874; *Joshua*, 1876; *Christmas Oratorio*, 1877; Berlioz's *Flight into Egypt*, 1879; Sullivan's *Prodigal Son*, 1879; Saint-Saëns's *Deluge*, 1880; Graun's *Death of Jesus*, 1882; Gounod's *Redemption*, Rubenstein's *Tower of Babel*, Paine's *Nativity*, Bruch's *Arminius*, 1883; Gounod's *Mors et Vita*, 1886. To 1879, the *Messiah* had been performed 68 times, the *Creation* 60, Neukomm's *King David* 57, *Moses in Egypt* 45, *Elijah* 43, *Samson* 33. See Grove's *Dictionary of Music* and appendix, and Ritter's *Music in America*, new ed. 1890.

ORATO'RIUM [Lat.; called in Greek, *eukterion* or *proseukterion*, as distinguished from *ecclesia* 'a church']: see ORATORY.

ORATORY, the art of an orator: see under ORATION: see also ELOQUENCE: RHETORIC: READING AND SPEAKING.

ORATORY, n. *ŏr'ă-ter-ĭ* [F. *oratoire;* It. *oratorio*, an oratory, a private chapel—from L. *orārĕ*, to pray]: apartment or building designed for worship private or domestic. From the earliest times, the use of oratories is traceable in the history of the church; and before the regular organization of parishes, they had probably a considerable place in the usual, though not in the public worship. At a later period, oratories became a common appendage of the castles and residences of the nobility, and were of two kinds; the first, simply for private or family prayer and other devotion; the second, for celebration of mass. The latter fell properly under the jurisdiction of the bishop or the parochial clergy, and many jealousies and disputes grew out of their establishment or direction. The Council of Trent (Sess. xxii., *De Reformatione*) placed them under very stringent regulations, which have been enforced and developed by later popes, especially by Benedict XIV.

ORA'TORY, CONGREGATION OF THE: learned congregation or body of priests in the Rom. Cath. Chh., founded by St. Philip de Neri (for its early history, see NERI, PHILIP DE). It is remarkable that this extraordinary man, unlike most other founders of religious bodies in the Rom. Cath. Church, had never committed to writing any definite body of rules for the government of the brethren. Even his scattered papers, from which his plans and intentions might have been collected, had been burned by his orders a short time before his death. Soon after that event, the Fathers, at the instance of Baronius, compiled from the existing practices and from memory a rule for the Congregation, framed so as to embody the spirit of St. Philip. This rule was approved of by Paul V. 1612. Feb. 21. The Fathers of the Congregation are a body of priests living in community, but without vows, and under a highly democratical constitution. They are at liberty to withdraw at any time, and to resume possession of the property which they had brought with them at entrance; and even during their association, each mem-

ber manages his own financial concerns, only contributing a fixed sum to the common expenses of the community. There is no superior-gen. as in other orders. Each house is distinct and independent. In each, the superior is elected for only three years, and his position does not give him any personal pre-eminence whatever. The members take their places according to seniority, not according to official rank, and the superior is compelled to take his turn in all the duties, even down to the seminenial office of serving in the refectory. The main occupations of the Fathers, beyond those of attending to the public service of the church, and the duties of the pulpit and the confessional, are in the cultivation of theological and other sacred studies, of which 'conferences' for discussion, in common, of theological questions, are a principal feature. The Congregation has produced many men of great eminence in sacred science, notably the great church historian, Cardinal Baronius, and his continuators. To these may be added the celebrated explorers of the Roman catacombs, Bosio, Severani, and Aringhi; and the no less eminent patristical scholar, Gallandi. The houses of the O. in Italy before the Revolution were numerous, and in high repute. The Congregation was early established in France by the celebrated Pierre (afterward Cardinal) de Berulle, in common with two Italian Fathers, and from France it extended to the Low Countries. One important difference, however, is noticeable between the French O. and the Roman original. In the French, all the houses of the country are subject to a single superior-general. In France, also, the Oratorians took charge of seminaries and of theological teaching. The French O., as well as the Italian, reckons many illustrious members; but the fame and utility of the French Congregation were much marred by the unhappy controversy about Jansenism. In 1847, this Congregation was introduced into England by Dr. John Henry Newman (q.v.). Soon after his secession from Anglicanism, he established a house, the members of which were for the most part ex-Anglicans like himself, near, and finally at Birmingham; and soon afterward, a second at London, since transferred to Brompton.

ORB, n. *ŏrb* [F. *orbe*—from L. *orbem*, a circle, a ring: It. *orbe*]: a circular body; any celestial sphere; in *OE.*, period or revolution of time; sphere of action; the eye: V. in *OE.*, to form into a circle. ORBED, a. *ŏrbd* or *ŏr'bĕd*, round; circular. ORB-LIKE, a. in the form of an orb. ORBICULAR, a. *ŏr-bĭk'ū-lĕr* [L. *orbic'ulāris*]: spherical; circular; made in the form of an orb; in *bot.*, having a rounded leaf with the petiole attached to the centre of it. ORBIC'ULARLY, ad. *-lĭ*. ORBIC'ULARNESS, n. *-nĕs*, the state of being orbicular. ORBIC'ULATE, a. *-ū-lāt*, or ORBIC'ULATED, a. *-lā-tĕd*, made or being in the form of an orb; orbicular.—SYN. of 'orb, n.': ball; sphere; globe; orbit; circle; circuit; wheel.

ORBIS, n. *ŏr'bĭs*, or ORB-FISH [L. *orbis*, a circle]: a fish of a circular form, found in the Indian seas.

OR'BIS PIC'TUS (the *Pictured World*) : title of the first picture-book or illustrated manual of instruction for the young, by the celebrated educationist, Comenius, pub. Nürnberg 1657. It was long a great favorite with the youth of Germany, and continued to be reprinted, in modified forms, till recent times. Comenius felt that to give words without things to the very young pupil was not only to retard his progress, but also to lay the foundation of vague and inaccurate conceptions. Hence his introduction of pictures for those beginning the study of Latin, connecting the word with the picture. An advance on this idea was made by Pestalozzi, who aimed at presenting to the eye the thing itself, whenever practicable. Hence, the modern object-lessons.

ORBIT, n. *ŏr'bĭt* [F. *orbite*—from L. *orbĭta*, a track, a path—from *orbis*, a circle: It. *orbita*]: the path or course described by a celestial body in the heavens (see below): the cavity in the skull containing the eyeball. ORBITAL, a. *ŏr'bĭt-ăl*, pertaining to the orbit of the eye.

OR'BIT, in Astronomy: path described in space by a heavenly body in its revolution round its primary.* The path so described is of elliptic form, and would be accurately an ellipse, were it not for the disturbing influence of the other heavenly bodies : see PERTURBATIONS. The complete determination of a planet's O. is of highest importance to astronomers, as it enables them to predict the planet's place in the heavens at any period, and thus determine the exact date of eclipses of the sun and moon, of transits and occultations of the planets, and of the appearances and disappearances of comets. For the determination of a planet's O., it is necessary to know three things: 1. The situation of the *plane* of the O. in space ; 2. The position of the O. in this plane; and 3. The situation at a given epoch, and rate of motion, of the planet in its O. Since the plane of the ecliptic is for convenience taken as the reference plane, the position of the plane of a planet's O. is known when its inclination to the plane of the ecliptic (1), and the line of intersection of the two planes (2), are known. Since the sun, which is the focus of the planetary orbits, lies in this line of intersection, the O. cannot lie wholly above or below the plane of the ecliptic, but must cut it in two points, called *Nodes* (q.v.), and the position of the line of intersection, or line of nodes, is generally given in terms of the longitude (or angular distance) of the ascending node, reckoning from the equinox. The situation of a planet's O. in its plane is determined when we know its form (3), size (4), and the position of its major axis or line of apsides (5). The size and form of the O. depend on the length of its major and minor axes, but astronomers prefer to employ the major axis and eccentricity (see ELLIPSE); and the position of the major axis is known by determining the heliocentric longitude of its *perihelion* (i.e., the extremity of it which is nearest the

* The sun is the primary of the planets and comets, and each planet is the primary of its satellites (secondary planets).

sun). To complete our knowledge of a planet's motion, all we now require are the epoch of its appearance at some determinate point of its O., say, at the perihelion (6), and the velocity of its motion in its O. (7), for when this last is known, the law of areas, as given in Kepler's second law, enables us to determine the position of the planet in its O. at any future period. These seven facts are called the seven 'elements of a planet's orbit.' The same principles apply to the orbits of the comets and satellites, though, in the case of the latter, the effect of disturbing forces is so great as to produce considerable change of the elements in one revolution.

ORBULINA, n. *ŏr'bū-lī'nă* [L. *orbis*, the world, a sphere]: foraminifera, in the form of perforated spheres.

ORC, n. *ŏrk* [L. *orca*, a whale]: a species of whale.

OR'CA: see GRAMPUS.

ORCADIAN, a. *ŏr-kā'dĭ-ăn* [L. *Orcădēs*, the Orkneys]: pertaining to the Orkney Islands: N. a native or inhabitant of the Orkneys.

ORCAGNA, *ŏr-kân'yâ* [contraction of It. *Arcagnuolo*, archangel]; acquired name, ANDREA DI CIONE: famous Italian artist: 1316–76 approximately; b. Florence; son of a sculptor and goldsmith, his three brothers also becoming artists. During much of the 14th c., he stood pre-eminent—as a painter combining strong realistic qualities with spiritual, and as an architect and sculptor elaborating exquisite creations. Chief of the latter is the tabernacle of the Virgin, in the church of San Michele, Florence, said to have cost 96,000 florins; it is pure Gothic, richly inlaid, combining altar, shrine, reredos, pyramidal in general form, and of white marble; the spire upholds a figure of St. Michael; lower, on the roof, are the apostles, and the lateral panels have groups from the life of the Virgin; one of the figures represents the artist, with name and date 1359. The church itself was from his designs; and the beautiful Loggia di Lanzi, ascribed to him, may have been from his plans, but was erected after his death. He was, withal, a worker in mosaic, and a poet. His chief works as a painter are frescoes, notably those of the chh. of St. Maria Novella, and the Strozzi chapel, the latter having a *Last Judgment;* also the series in the Campo Santo at Pisa, the subjects including the *Triumph of Death*, the *Last Judgment* and *Hell.* To these Michael Angelo and Raphael are said to have been indebted. But the frescoes have been much injured by time, and have been more or less worked over in restorations. Still in good preservation are his admirable pictures in the altar-panels of the Strozzi chapel.

ORCEIN, n. *ŏr'sĕ-ĭn:* see under ORCIN.

ORCHARD, n. *ŏr'chĕrd* [Goth. *aurtigards;* Icel. *jurtagardr*, a garden: Dan. *urtgaard*, a herb-garden—from *urt*, a herb; *gaard*, a garden: AS. *ortgeard*, an inclosure for worts or vegetables—from *wort*, a herb; *geard*, a yard]: garden for fruit-trees; also the trees therein. Or'chardist, n. *-ĭst*, one who owns or cultivates a fruit-garden. Orcharding, n. *ŏr'chĕrd-ĭng*, the cultivation of orchards.—An *Orchard* is a collection of trees cultivated for their fruit. The term is properly applied to trees producing larger fruits than those grown in the fruit-garden (q.v.) Apples, pears, peaches, plums, and cherries are the principal fruits grown in orchards in this country. A collection of orange trees is called a grove. As fruits are greatly modified by climate and soil the choice of varieties should be made with reference to the location in which they are to be grown. The land for an O. should be in a good state of fertility and should be enriched and given to the production of some cultivated crop the season previous to its being planted with trees. It should be well plowed and harrowed, and if wet should be thoroughly drained before the trees are put out. If too level for natural drainage, the ground should be plowed in ridges, upon which the trees should be set. Transplanting may be done either in the spring or after the leaves have fallen in autumn. Small trees will be more certain to grow and will come into bearing sooner than large ones. The rows should be perfectly straight. Holes should be made of sufficient size to allow the roots to be spread to their fullest extent and the tree should stand at about the same depth as it did in the nursery. Fine earth should be closely packed around the fibres and roots to keep the tree firmly in place and to exclude air from the roots. For several years after the trees are set the ground should be well cultivated. If properly manured, potatoes or root crops may be grown among the trees, but cultivation near the rows must be shallow. Grass should not be grown in the O. till the trees attain considerable size, and grain crops should never be allowed among the trees. A vigorous growth should be maintained by the application of fertilizers to the land late in the autumn. All kinds of farm stock must be kept from the young O. Protection from injury by mice may be secured by piling mounds of compost around the trunks in the autumn, and spreading the material over the ground in the spring. When the tree is set the top should be cut back to balance its loss of roots in removal. The form of the top should be regulated by careful pruning each season. When the trees become fruitful, overbearing should be prevented by a systematic thinning of the fruit. This will greatly improve the quality of the fruit, and prevent injury to the trees and exhaustion to the soil. The distance apart of trees in an O. is modified by the kind of fruit and to some extent by the variety—some sorts being much freer growers than others. The following are about the average distances: apples, free growing sorts, 40 ft., others 30 to 35 ft.; pears 20 to 25 ft.; peaches, 15 to 20 ft.; cherries. 20 ft., plums, 15 ft.; quince, 8

ft. The multiplication of varieties is effected by sowing the seeds of ripened fruit. The seeds should be taken from the finest specimens of fruit of the best varieties; and to gain advantage of natural cross fertilization, the selections should be from trees standing near each other. Propagation of varieties is effected usually by grafting the roots of small trees or the stocks or small branches of larger ones, or by budding.

Dwarfed Fruit Trees are planted where grounds are small, and it is desired to obtain fruit as quickly as possible. They are also grown for ornament. Trees may be dwarfed by planting in pots containing poor soil: the roots can extend but a little way, and the trees are practically starved. Another method of dwarfing is by inducing roots to form near the end of a branch, which is afterward removed and the roots confined where they will obtain but little food. But the course adopted by nurserymen is to graft or bud upon stocks which make only a slow and small growth. The fruit trees most frequently dwarfed are the pear, apple, and cherry. The pear is sometimes worked on the apple and the mountain ash, but usually and far more successfully on the quince. With some varieties the quality of the fruit is greatly improved by growing on the quince, and these sorts are seldom grown as standard trees. Other kinds do not grow readily on the quince, and in order to dwarf them the quince is first budded with a free-growing variety of the pear, and when the twig thus secured has reached a proper size, a bud of the desired kind is worked thereon. Only a few sorts require this double working. The majority of varieties do about as well on the quince as on their own roots, and dwarfs thrive in some soils in which the standards do not. Dwarf trees bear at a much earlier age, but they are shorter-lived and need more manure, pruning, and cultivation than standards. The apple is dwarfed by budding on the Paradise or the Doucin stock. The former is preferable where very small and early bearing trees are desired. These dwarfs reach a height of four ft., begin to bear in three or four years from the time of budding, and produce large and handsome specimens of fruit. Summer and autumn varieties are more often dwarfed than the winter sorts. The trees are beautiful and in small gardens are also useful. The cherry is sometimes dwarfed by working on the Mahaleb stock; and though in cold climates it has some advantages over the standard, it is also open to various objections, and the dwarfed trees have not a large sale. The distances apart for setting dwarfed trees are about as follows: pears, 10 ft.; apples, 8 ft.; cherries, 10 ft. Pears grown on quince stock and set in orchards where they receive less pruning than in the garden require 12 ft.; and apples on Doucin stocks 10 ft. space.

OR'CHARD GRASS: see COCK'S-FOOT GRASS.

ORCHARD-HOUSE: structure adapted to cultivation of fruits, of finer kinds than can be produced in the open air, or in greater perfection, without the aid of artificial heat. It is a glass-roofed shed, the front of which is lower than the back, so that the roof slopes toward the sun, and by due arrangement a limited space can be made to produce a prodigious quantity of fine fruit. The trees are planted in pots, are never allowed to attain a considerable size, and are so trained and pruned as to have the greatest possible amount of fruitful wood within the smallest possible compass. The pots have a large hole in the bottom, through which the roots may pass; and are placed upon a border carefully prepared for them, of loose and open materials, such as cinders, lime-rubbish, and broken bricks, enriched by manure. After the fruit is gathered, the roots are cut through at the bottom of the pot, and the trees are set aside to rest for the winter; and this treatment is repeated from year to year. The orchard-house is generally a very low structure, so that the foliage and fruit are very near the glass; its back being only 7 ft. high, and its front only $2\frac{1}{2}$ ft., for a width of 12 ft. A path is excavated as a trench of 2 ft. deep, and $2\frac{1}{2}$ ft. wide, through the middle of it. For details as to glazing, ventilation, and instructions as to treatment of trees, see *The Orchard-house* (pamphlet by the inventor Rivers, of London); also Chambers's *Information for the People*, I. 591–2 (new ed.).

ORCHESTRA, n. *ŏr'kĕs-tră* [Gr. *orchēstra*, the lowest part of a theatre, among the Greeks, where the chorus performed the dances—from *orche'ŏmai*, I dance: L. and It. *orchestra:* F. *orchestre*]: the part of a theatre or public place assigned to the musicians: body of musical performers; written also ORCHESTRE, *ŏr'kĕs-tĕr*. ORCHESTRAL, a. *ŏr-kĕs'-trăl*, suitable to an orchestra, or performed in it.—*Orchestra* in the Greek theatres was the place allotted to the chorus of dancers; in modern theatres, to the instrumentalists; and in the modern concert-room, to the instrumental and vocal performers. The word denotes also the musicians collectively. A complete O. consists of stringed and wind instruments, and instruments of percussion. The employment of stringed and wind instruments together was long deemed a barbarism. Glück was among the first composers who showed that they could be effectively combined: his ideas were developed by succeeding composers. The perfecting of the old instruments, and the introduction of new ones formerly confined to military bands, have added immensely to the power and resources of the modern O., whose capacities, however, are sometimes misused. The proper strength of an O. depends on considerations connected with the locality. The stringed instruments should always greatly outnumber the wind instruments; and the wind instruments the instruments of percussion. The stringed instruments in general use are the violin, viola, violoncello, and double-bass, and their number often amounts to 50, while even in a large O there are seldom more than two each of flutes, hautboys, or bassoons. The horn, trumpet, and ophicleide or serpent—the other wind instruments admitted into the

O.—are admitted as sparingly; and of instruments of percussion, a pair of kettle-drums is often considered sufficient, though cymbals and triangles are occasionally added. In a small orchestra, trumpets, trombones, the serpent, and the kettle-drum should be avoided as too noisy. By far the greatest part of the work falls to the share of the stringed instruments, the parts for which form a complete quartet for first violin, second violin, viola, and violoncello, which should be perfect within itself, independently of the parts for the wind instruments. The object of the double-bass is to enforce the violoncello part. This full quartet is occasionally interrupted by harmony in two or three parts, or passages in unisons or octaves. The success of the combination of wind and stringed instruments depends on the skill and judgment of the composer. The bassoon, horn, or flute may double any given part of the stringed instrument quartet, so as to produce an effect of reinforcement, or it may have its own distinctive melody. An occasional variety is produced by the entire cessation of stringed instruments for a short period, letting the wind instruments be heard alone. The O. of a concert-room should be so arranged that the front is about five ft. above the level of the floor, and it should rise gradually in steps toward the end wall, whose angles ought to be rounded off so as to reflect the whole body of sound. Reverberation is essential to the proper effect of music. From the exigencies of dramatic representation, a theatrical O. must necessarily be much inferior to a concert O.; the instrumentalists, brought together in the lowest part of a theatre on a horizontal plane between the spectators and the stage, are deprived of most of the advantages arising from a proper arrangement.

ORCHESTRION, *awr-kĕs'trĭ-on:* musical instrument resembling a portable organ; so constructed that all sounds within its compass may be increased or diminished; invented about 1789, but soon disused. The O. now known has action like a barrel-organ, and imitates an orchestra.

ORCHID, n. *awr'kĭd*, or ORCHIS, n. *awr'kĭs* [L. and Gr. *orchis*, a plant with roots in the form of testicles: It. *orchide:* F. *orchis*]: monocotyledonous plant having round fleshy tubers, whose flowers are generally singular in form—much esteemed by cultivators; plants of the ord. *Orchidācĕæ* (see ORCHIDACEÆ). ORCHIDACEOUS, a. *awr'kĭ-dā'shŭs*, or ORCHIDEOUS, a. *awr-kĭd'ē-ŭs*, pert. to plants of the orchis kind.

ORCHIDACEÆ, *awr-kĭ-dā'sē-ē*, or ORCHIDEÆ, *awr-kĭd'ē-ē;* popularly called ORCHIDS: natural order of endogenous plants, remarkable for the structure of their flowers, which are of great beauty and exquisite fragrance. The perianth sometimes exhibits much variety of forms, even in the same species; but is always irregular, its segments differing much from each other. There are usually six segments, arranged in two rows (*calyx* and *corolla*); though some of the most extraordinary forms of orchideous flowers are produced by the combination of certain segments into one piece. Spurs and other appendages of some of the segments are common. The inner segments are often beau-

particularly in America. Many are epiphytes, adorning the boughs of trees with splendid flowers. This is chiefly the case with tropical species, those of colder climates mostly growing on the ground.—SALEP (q.v.), a nutritious article of food still used in the Levant, is obtained from root-tubercles of a number of species. The only other product of the order, which is of any commercial importance, is Vanilla (q.v.). The fragrant Faam (q.v.) leaves are the leaves of an orchid. Several species are known to possess tonic, stimulant, and antispasmodic properties, but none are of much importance in medicine.

Orchis mascula:
a, the lip of the perianth.

Orchids have of late been much cultivated for the peculiarity and beauty of their flowers, and many tropical species are among the most esteemed hothouse plants; houses being sometimes arranged specially for them. Many of the epiphytal kinds may be planted in pots filled with loose fibrous peat, the roots of others are placed in baskets, or are fastened to blocks of wood, with a little moss or some such thing around them, to keep them from becoming too dry, and are thus placed on the shelves, or suspended from the roof of the house. Careful attention to temperature is necessary, also to ventilation; and though much heat and moisture are requisite, the atmosphere must not be constantly very hot and humid, but seasons of rest must be given to the plants, which in their native climates have generally a wet and a dry season, the latter being to them in many respects what the winter is to plants of temperate regions. The orchids usually are propagated by division of the tubers. Even those that grow in the

tifully colored. **The interior segment** of the corolla is called the lip, **and is often lobed, spurred** or furnished with curious appendages of different kinds. The stamens are united with the style into a single central column; the distinctive character of the Linnæan class *Gynandria*, of which the O. form the chief part. There is usually only one anther, with a tubercle on each side of it, the tubercles being abortive anthers; but sometimes the two lateral anthers are perfect, and the central one is abortive: and very rarely all three anthers are perfect. The anthers are usually two-celled; the grains of pollen cohering in two or more masses. The ovary is inferior, one-celled; the stigma usually a mere hollow in front of the column. The fruit is usually a capsule, opening with six valves, three of which have placentæ; the seeds numerous and very small. In a few cases, the fruit is fleshy. The O. are generally herbaceous perennials; but some in warm climates are shrubs, and some of these, as Vanilla, are climbers. The root is composed usually of simple, cylindrical fibres, often accompanied with one or two fleshy tubercles, a tubercle dying and a new one being produced annually. The leaves are always simple, **alternate,** often

Orchis morio.
a, parts of the flowers.

sheathing at the base, often leathery, sometimes arising, in tropical species, not directly from the stem, but from fleshy bulb-like excrescences of it.—The species of O. are very numerous, between 4,000 and 5,000, of which about 3,000 have been described. They are found in all parts of the world, except the coldest and the most arid regions; but are most numerous in the humid forests of the torrid zone,

ground depend but little on the soil for nourishment, drawing their chief supply from the air. It is desirable to avoid for them a soil that holds moisture.—Lindley distinguished himself in the study of this important order.

OR'CHIL AND ORCHEL'LA WEED: see ARCHIL.

ORCHIS *awr'kĭs:* genus of *Orchidaceæ*, to which, as now restricted, 11 of the British species are referred. In a more general application it designates any member of the orchid group. The roots of some species of this genus yield salep. The *lip* of the flower in this genus has a spur. The flowers of the Early Purple O. (*O mascula*), one of the most common species, are sometimes fragrant; but those of the Lizard O. (*O hircina*) are remarkable for their disagreeable goat-like or lizard-like smell.

ORCHITIS, n. *ŏr-kī'tĭs* [Gr. *orchis*, a testicle]: inflammation of the testicle.

ORCHOMENOS, *awr-kŏm'ē-nos:* a famous and very ancient city of Bœotia, cap. of the anc. independent kingdom of the Minyæ, hence called Minyean O., to distinguish it from another O. in Arcadia. It was n. of Lake Copaïs, on the left bank of the Cephissus, and extended from the marshy edges of the lake up the face of a steep rocky hill, on which stood the Acropolis. In the earliest times, its dominions extended to the sea. Homer compares its treasures to those of Egyptian Thebes, and tells us that it sent 30 ships to the Trojan war. Some time after this event, it became a member of the Bœotian confederacy. During the Persian war, like the other towns of Bœotia, it abandoned the national cause. Its govt. was thoroughly aristocratic, and after the Peloponnesian war, when Thebes became a democracy, O. took part with Sparta, and shared in its first triumph over Thebes; but the victory of Epaminondas at Leuctra B.C. 371, placed O. at the mercy of the Thebans, who soon afterward destroyed it by fire, and sold its inhabitants as slaves. It was rebuilt during the Phocian war, but a second time destroyed in the reign of Philip of Macedon, who, however, once more rebuilt it; but it never again became prominent in history. O. was famous for its great musical festival in honor of the Graces, when poets and musicians assembled from all quarters to compete for prizes. In its ruins Schliemann (q.v.) uncovered the treasury, rich in interest.—See K. O. Müller's *Orchomenos und die Minyer*, Leake's *Northern Greece*, and Mure's *Tour in Greece*.

ORCIN, n. *ŏr'sĭn* [F. *orcine*]: substance existing in the lichens from which archil and litmus are prepared. Orcin ($C_7H_6O_2$) may be obtained by boiling certain species of *Roccella* or *Lecanora* with lime for some hours, removing the lime by a current of carbonic acid, evaporating and extracting with boiling alcohol, from which the O. separates in red crystals. With chloride of lime, it gives a purple red color, which quickly changes to a deep yellow. O. is the true color-producing substance or chromogen of these lichens. ORCEIN, n. *ŏr'sē-ĭn* ($C_7H_7NO_3$), dark-red pigment obtained by the action of ammonia and oxygen

on orcin. It is a nitrogenous compound of strong tinctorial power. When isolated, orcein forms a red flocculent powder, freely soluble in alcohol, forming a scarlet fluid. Potash and ammonia dissolve it readily, forming a splendid purple, the basis of the ordinary archil of commerce. With metallic salts, its alkaline solutions yield beautiful purple lakes.

ORCUS, n. *ŏr'kŭs* [L.]: in *Rom. myth.*, the lower regions; the abode of the dead.

ORD, *awrd*, EDWARD OTHO CRESAP: 1818, Oct. 18—1883, July 22; b. Cumberland, Md. He graduated from West Point 1839, served in Fla. in the Seminole war about three years as 2nd lieut. of artillery, and was promoted 1st. lieut. 1841. He was transferred to the Pacific coast 1847 and prevented threatened outbreaks in that region during part of the Mexican war. He reached the rank of capt. 1851, served in Mass. two years; then returned to the west, and was engaged in making a coast survey, and later in keeping the restless Indian tribes of the region under control. Soon after the opening of the civil war he was called to the east, appointed brig.gen. vols., and placed in command of a brigade of Penn. troops. At the battle of Dranesville, Va., he defeated the Confederate force under Gen. Stuart. He was promoted maj.gen. vols. 1862, May, and the following month was transferred to the valley of the Miss. under Gen. Halleck, and afterward under Gen. Grant. He received honorable mention for brilliant service in the battles near Corinth, and in one of these engagements was seriously wounded. At the siege of Vicksburg and in the taking of Jackson, Miss., he rendered efficient service. Failing health compelled his retirement for several months; but 1864 he was called to quell disturbances around Baltimore, and later in that year commanded a force at Petersburg, where he was severely wounded. Illness again caused his temporary retirement; but 1865 he succeeded to the command of the dept. of Va. and the Army of the James, and showed great skill and bravery in the attack on Richmond, and in the closing operations of the war. His connection with the volunteer service closed 1866, Sep. After serving on the Pacific coast and in the southwest, he was retired 1880, Dec. 6. By various promotions he had reached the ranks of lieut.-col. of artillery, maj.gen. vols., and brig.gen U. S. A. After leaving the army he was civil engineer of a railroad in Mexico. He died at Havana, of yellow fever, while on a journey to New York.

ORDAIN, v. *ŏr-dān'* [L. *ordinārĕ*, to arrange or set in order—from *ordo*, order, arrangement: OF. *ordener*, F. *ordonner*, to ordain: It. *ordinare*]: to appoint; to decree; to establish; to institute; to invest with ministerial or sacerdotal functions. ORDAIN'ING, imp.: ADJ. investing with sacerdotal or ministerial functions by certain ceremonies, as the laying on of hands. ORDAINED, pp. *ŏr-dānd'*. OR'DINA'TION, which see. ORDAIN'ER, n. *-ĕr*, one who ordains or appoints.—SYN. of 'ordain': to arrange, regulate; set; prescribe; enact; constitute; invest.

ORDEAL, n. *ŏr'dē-ăl* [AS. *ordæl;* Dut. *oordeel*, a mode of judgment by fire or water, by wager of battle, and the issue was supposed to be determined by the hand of God: Ger. *urtheil*, judgment: mid. L. *ordalium*]: ancient form of trial to determine guilt or innocence by causing the accused to pass through fire or water, or by the wager of battle; any severe test of patience, courage, skill, and the like; a severe trial or scrutiny. *Note.*—The latter part of the word is the same as *deal* 1 or *dole*, as seen by Dut. *deel*, Ger. *theil;* the first part is Dut. *oor-*, Ger. *ur-*, Goth. *us*, out, out of—see Skeat.—The practice has prevailed largely among widely-separated nations, of referring disputed questions, particularly such as relate to the guilt or innocence of an individual, to the judgment of God, determined either by lot, or by the success of certain experiments. Of its existence among the ancient Jews, we have an instance in Numbers v., where a Hebrew woman, accused of adultery, is required to drink the waters of jealousy as a test of innocence: a similar ordeal for incontinence is in use among the natives of the Gold Coast of Africa. Compurgation of accused persons by fire, as existing among the Greeks, is referred to in Sophocles's *Antigone*. Among the Hindus, the O. has been practiced in nine different ways—by the *balance*, by *fire*, by *water*, by *poison*, by the *cosha* or drinking water, in which images of the sun and other deities had been washed, by *chewing-rice*, by *hot oil*, by *red-hot iron*, and by drawing two images out of a jar into which they have been thrown. (*Asiatic Researches*, I. 389.)

The O. seems prevalent throughout Africa. 'When a man,' says Dr. Livingstone, 'suspects that any of his wives have bewitched him, he sends for the witch-doctor, and all the wives go forth into the field, and remain fasting till that person has made an infusion of the plant (called "goho"). They all drink it, each one holding up her hand to heaven in attestation of innocency. Those who vomit it are considered innocent, while those whom it purges are pronounced guilty, and put to death by burning. The innocent return to their homes, and slaughter a cock as a thank-offering to their guardian spirits. The practice of O. is common among all the negro nations north of the Zambesi.' The women themselves eagerly desire the test on the slightest provocation; each is conscious of her own innocence, and has the fullest faith in the *muavi* (the O.) clearing all but the guilty. There are varieties of procedure among the different tribes. The Barotse pour the medicine down the throat of a cock or dog, and judge of the innocence or guilt of the person accused by the vomiting or purging of the animal.

Throughout Europe in the dark ages the O. existed under the sanction of law and of the clergy. The most prevalent kinds were those of *fire*, *water*, and the *wager of battle*. *Fire ordeal* was allowed only to persons of high rank. The accused had to carry a piece of red-hot iron some distance in his hand, or to walk nine ft. barefoot and blindfolded over red-hot plowshares. The hand or foot

was bound up and inspected three days afterward. if the accused had escaped unhurt, he was pronounced innocent; if otherwise, guilty. Under such a judicial system, there were probably few acquittals; but it is believed that in the severer kinds of O , precautions were sometimes taken by the clergy to protect those whom they wished to clear from suspicion. Queen Emma, mother of Edward the Confessor, when suspected of a criminal intrigue with Alwyn, Bp. of Winchester, is said to have triumphantly vindicated her character by walking unhurt over red-hot plowshares. *Water ordeal* was the usual mode of trial allowed to bondsmen and rustics, and was of two kinds—the O. of *boiling water*, and of *cold water*. The O. of *boiling water*, according to the laws of Athelstane, consisted in taking a stone out of boiling water, where the hand had to be inserted as deep as the wrist; what was called the triple O. deepened the water to the elbow. The person allowed the O. of *cold water* (usual mode of trial for witchcraft), was flung into a river or pond; if he floated without any appearance of swimming, he was judged guilty—while if he sank, he was acquitted.

The *wager of battle* was a natural accompaniment of a state of society which allowed men to take the law into their own hands. The challenger faced the west, the challenged person the east; the defeated party, if he craved his life, was allowed to live as a 'recreant;' that is, on retracting the perjury which he had sworn to. See BATTLE, TRIAL BY.

Other kinds of O. were practiced in particular circumstances in different parts of Europe. In the O. of the *bier*, a supposed murderer was required to touch the body of the murdered person, and pronounced guilty if the blood flowed from his wounds. The O. of the *Eucharist* was in use among the clergy: the accused party took the sacrament in attestation of innocence, it being believed that, if guilty, he would be immediately visited with divine punishment for the sacrilege. A somewhat similar O. was that of the *corsned*, or consecrated bread and cheese: if the accused swallowed it freely, he was pronounced innocent; if it stuck in his throat, he was presumed to be guilty. Godwin, Earl of Kent, in the reign of Edward the Confessor, when accused of the murder of the king's brother, is said to have appealed to the O. of the corsned, and been choked by it. An early form of O., abolished by Louis le Debonnaire 816, was that of the *cross:* the accuser and accused stood upright before a cross, and he who first fell, or shifted his position, was pronounced guilty. It was abolished, as being irreverent toward the mystery of the cross. Besides these, there was the O. by *lot*, dependent on the throw of a pair of dice, one marked with a cross the other plain.

Trial by O. at first carried with it the sanction of the priests, as well as of the civil power, though the clergy in the course of time came to discountenance it. In England it seems to have been continued till the middle of the 13th c. On the continent generally it was abolished rather

earlier, though as late as 1498 we find the truth of Savonarola's doctrine put to the test, by a challenge between one of his disciples and a Franciscan friar, to walk through a burning pile. In Scotland, 1180, we find David I. enacting, in one of the assemblies of the frank tenantry of the kingdom, which were the germ of parliaments, that no one was to hold an ordinary court of justice, or a court of O., whether of battle, iron, or water, except in presence of the sheriff or one of his sergeants; though if that official failed to attend after being duly summoned, the court might be held in his absence. The first step toward abolition of this form of trial in Saxon and Celtic countries, seems to have been the substitution of compurgation by witnesses for compurgation by ordeal. The near relatives of an accused party were expected to come forward to swear to his innocence. The number of compurgators varied, according to the importance of the case; and judgment went against the party whose kin refused to come forward, or who failed to obtain the necessary number of compurgators. To repel an accusation, it was often held necessary to have double the number of compurgators who supported it, till at length the most numerous body of compurgators carried the day.

ORDER, n. *ŏr'dĕr* [F. *ordre*—from L. *ordĭnem*, an arranging, order: It. *ordine*]: methodical arrangement; regularity; established method or process; proper state; regular government; a law; a command; rank or class; a society or fraternity (see ORDER, RELIGIOUS). In *nat. hist.*, group of animals or plants constituted for the purpose of classification, inferior to *class* and *sub-class*, but superior to *family*, *tribe*, *genus*, etc. The use of the term, however, is not precisely the same in botany and in zoölogy, by reason of the greater range of zoölogy. A botanical order is often called a *family*, while the division corresponding to *family* in zoölogy is often termed in botany a *tribe*. The term NATURAL ORDER is used in botany to designate an order belonging to the natural system of classification, in distinction from one of an artificial system devised for mere convenience of the student; and it signifies that the limits of the order agree with the truth of nature, and that it thus exhibits affinities really existing. In all branches of nat. history, classification now proceeds on this principle. In *classic arch.*, one of the five principal methods employed by the ancients in constructing and ornamenting the columns of an edifice—these were (1) Tuscan, (2) Doric, (3) Ionic, (4) Corinthian, (5) Composite; the first and fifth were Roman orders, and mere modifications of the others; the remaining three were Greek: technically the Order or Ordonnance comprises the column with its base and capital and the entablature (see COLUMN: GRECIAN ARCHITECTURE: ROMAN ARCHITECTURE). In *OE.*, measures; care. INT. a call to a speaker by one or more of an audience to attend to the rules of the house or assembly: V. to regulate; to direct or command; to lead; to manage; to give directions to. OR'DERING, imp.: N. disposition; management. OR'DERED, pp. *-dĕrd*. OR'DERER, n. *-ĕr*, one who orders.

OR'DERLESS, a. *-lĕs*, disorderly. OR'DERLY, a. *-lĭ*, regular; systematic; performed in good order; peaceable; being on duty, as an officer: N. a soldier who attends on a superior officer to carry orders (see below): AD. methodically. OR'DERLINESS, n. *-nĕs*, the state of being orderly or methodical. IN ORDER, according to established rule. IN ORDER TO, for the purpose of; as means to an end. ORDER-BOOK, a shop-book for entering the orders of customers, or directions for purchasers. ORDER OF THE DAY, a phrase used in legislative and deliberative assemblies, denoting the business regularly set down for consideration on the minutes or votes; in *mil.*, specific directions or information issued by a superior officer to the troops under his command. OUT OF ORDER, transgressing the ordinary rules or laws of the society or meeting. ORDERS, or HOLY ORDERS, in the *Episcopal Chh.*, the three orders of the Christrian ministry, but usually understood as applying to deacons and priests (see ORDERS, HOLY, below; also ORDINATION). TO TAKE ORDERS, to enter the ministry of the church by being ordained—used in reference to the two *orders*, deacons and priests; to take commissions to supply goods. ARMY ORDERS, general, divisional, brigade, or regimental. General orders are issued by the commander-in-chief of an army, and affect the whole of his force. The others emanate from generals of division or brigade, or from officers commanding regiments, and severally affect their respective commands. LETTERS OF ORDERS, the certificates given by the bishop to the person he has ordained, that the latter has been duly admitted to the order of deacons or priests. GENERAL ORDERS, the orders which a commander-in-chief issues to his troops. RELIGIOUS ORDERS, in the *R. Cath. Chh.*, societies established for religious purposes, such as the monastic orders of the Benedictines, the Franciscans, etc., and the order of the Jesuits (see ORDER, RELIGIOUS). ORDERS IN COUNCIL, temporary rules or laws issued by the sovereign, by and with the advice of the *Privy Council*, to meet particular emergencies (see below). ORDER OF BATTLE, the different arrangements made by an army either to attack or receive an enemy. ORDERS OF KNIGHTHOOD, see KNIGHTHOOD. POST-OFFICE ORDER, see MONEY ORDER, under MONEY. STANDING ORDERS, in *parliament*, certain rules and regulations laid down for their own guidance, which must be invariably followed, unless suspended by a formal vote to meet some urgent case. SAILING ORDERS, the particular and final instructions given to ships of war.—SYN. of 'order, n.': method; mode; mandate; injunction; direction; precept; rule; regulation; row; grade; group; collection; family; tribe; fraternity; usage; fashion; custom;—of 'order, v.': to adjust; conduct; procure; methodize; dispose; arrange; systematize

OR'DER, Religious: aggregate of communities usually conventual, comprehended under one rule. There were also the societies, half religious, half military, out of which the institution of knighthood sprang; which arose from the necessity under which the monks lay of defending the possessions which they had accumulated, and the supposed duty of recovering Palestine from the Saracens, and retaining possession of it. The most famous among many orders of this kind were the Hospitallers or Knights of St. John of Jerusalem, the Knights Templars, and the Teutonic order: see Knighthood. Religious orders, beside these military orders included the monastic and the mendicant.

The earliest comprehension of monastic societies under one rule was effected by St. Basil (q.v.). Abp. of Cæsarea (329–379), who united the hermits and cœnobites in his diocese, and prescribed for them a uniform constitution, recommending at the same time a vow of celibacy. The Basilian rule subsists to the present day in the Eastern Church. Next in time was the Benedictine order, founded by St. Benedict (q.v.) of Nursia (480–543), who considered a mild discipline preferable to excessive austerity. The offshoots from the Benedictine order include some of the most important orders in ecclesiastical history, among others the Carthusians, Cistercians, and Præmonstrants. The order of Augustinians professed to draw their rule from the writings of St. Augustine (q.v.); they were the first order not entirely composed of laymen, but of ordained priests, or persons destined to the clerical profession.

The three mendicant orders of Franciscans, Dominicans, and Carmelites were instituted in the 13th c. Their principal purpose was to put down the opposition to the church, which had begun to show itself, and to reform the church by example and precept. At a later period the order of the Jesuits was founded, with the object of increasing the power of the hierarchy and putting down heresy.—For notices of the more important orders, monastic, military, and mendicant, see the separate titles: also Monachism: Knights.

ORDERICUS, *awr-dē-rī'kŭs*, Vitalis: mediæval historian: 1075—about 1143; b. Atcham, near Shrewsbury, England. He was taken to France at the age of five, was educated for monastic life in the abbey of Ouche, at Lisieux, and became a priest 1107. O. was author of a so-called Church History (*Historiæ Ecclesiasticæ*), 13 vols., a chronicle of events from the birth of Christ to his own time. Books 3–6 give an account of the Norman wars in England, France, and Apulia till the death of William the Conqueror. The last half of the book is the most valuable, being a record of the history of the author's own times. The first ed. of *Historiæ Ecclesiasticæ* was published by Duchesne, in *Hist. Norm. Scrip.* (1619). It has been printed also by the French Hist. Soc. (1840), and was translated into English by Forester (4 vols.—Bohn's *Antiquarian Library*).

OR'DERLY: soldier or sergeant appointed to wait on general and other commanding officers, to communicate their orders, and to carry messages. The *Orderly Officer*, or officer of the day, is the officer of a corps or regt., whose turn it is to superintendent its interior economy, as cleanliness, the goodness of the food, etc. *Orderly Non-commissioned Officers* are the sergeants in each company who are 'orderly,' or on duty for the week. On the drum beating for orders, they proceed to the Orderly Room, take down the general or regimental orders affecting their respective companies, show them to the company officers, and warn the necessary men for any duties specified in those orders. An *Orderly Book* is provided by the captain of each troop or company in a regt. for the insertion of general or regimental orders.

OR'DERS, HOLY: institution regarded in the Greek and Roman churches as a sacrament, by which ministers are especially set apart for the service of religion, and are regarded as receiving a certain religious consecration, or, at least, designation for their office (see ORDINAL: ORDINATION). While some of the reformed churches altogether deny a distinction of ranks in the ministry, none of them admits more than three ranks, bishop, priest, and deacon. But in the Roman and Greek churches, a further classification exists. In the Roman Church, a distinction is made between the major (or holy) orders and the minor orders. For general description of three of the major orders, viz., the three classes bishops, priests, and deacons, see HIERARCHY. A fourth rank of sub-deacons is now regarded as one of the major orders. The sub-deacon is an assistant to the deacon. The minor orders in the Roman Church are four in number—door-keeper, reader, exorcist, and acolyte. To none of these minor orders is any vow of celibacy annexed. Some of their functions had their origin in the peculiar religious condition of the early church. The duties of door-keeper arose chiefly out of the discipline in regard to the penitents and catechumens; but though these functions find no room in the modern discipline of the Roman Church, the door-keeper of the modern church is held to succeed to other functions of his ancient prototype in relation to the catechetical instruction of children and of the poor and ignorant. Preparatory to the receiving of these orders, candidates are initiated in what is called the *Tonsure*, which consists in the cutting off of the hair, as a symbol of separation from the world and its vanities—a rite which appears also as one of the ceremonies of the religious profession. Tonsure, however, is not reckoned as an order; it is but a distinguishing characteristic of a class. In the Roman Church, the sacrament of orders is held to produce an indelible character, and therefore to be incapable of being forfeited or of being validly repeated. This, however, applies only to the holy orders. The Greek Church has the distinction of major and minor orders. But the Greeks commonly exclude sub-deaconship from the major orders, and

all the functions of the four minor orders of the Roman Church are united by the Greeks in a single order, that of reader (*anagnōstes*).

In the Anglican and other Reformed Episc. churches, only the three higher orders, bishop, priest, and deacon are retained. An Anglican clergyman may be deprived of his benefice, or suspended by his bishop for various ecclesiastical offenses; and the right of the court of arches also to pronounce sentence of deprivation has been recognized. But in the usual case of deprivation, the clergyman does not forfeit his status of priest or deacon, which can be lost only by deposition or *degradation*. The ordinary has the power of degrading clerks convicted of treason, petit treason, murder, and certain other felonies, before judgment. A bp. may be deprived of his see by his metropolitan, with or without the co-operation of a synod of the bishops of the province; but it has been questioned whether he can be lawfully deprived of his orders as bishop. A clergyman of the Church of England cannot become a member of the house of commons; but there is nothing to prevent a minister of the Church of Scotland, or of any Presb. or Congl. church, from membership in the house of commons.

In Congl., Presb., and other non-episcopal churches, the ceremony of ordination is not held to impart any indelible character. A minister found guilty of heresy or immorality, is deprived of his office by *deposition*, by which his clerical status is forfeited. His removal from his charge, however, in any other way, does not affect his office as a minister; and a minister removed from one charge to another, or, after a time, inducted into a new charge, is not re-ordained. A minister having no charge or flock, may yet dispense the sacraments, if duly called upon. A minister deposed ceases altogether to be a minister, and is no more capable of any of the functions of the office, than if he had never been ordained.

The ceremony of *imposition of hands* is used in almost all Prot. churches in ordination of ministers, the ordaining bishop or presbyters placing the right hand on the head of the person ordained; and this act is always accompanied with prayer. In some denominations the act is deemed a proper and Scriptural form (I Tim. iv. 14), but not essential. In the Church of Scotland and other Presb. churches, when an already ordained minister is inducted into a new charge, no imposition of hands takes place. In the Scottish and American Presb. churches, candidates for the ministry are *licensed to preach the gospel* before being *called* to any particular charge, and are then styled *licentiates* or *probationers*. They are licensed, according to an old phrase, 'for trial of their gifts,' but are not entitled to dispense the sacraments; but this rule is not usually held with strictness in all Congl. churches, in which churches, indeed, though 'licensure' is regarded as *regularly* precedent to preaching, it is not considered indispensably so.

ORDERS IN COUNCIL.

ORDERS IN COUNCIL: in Great Britain, orders by the sovereign with advice of the privy council. The privy council has no power to legislate, except so far as authorized to do so by parliament; nevertheless in emergency, it has occasionally issued and enforced orders of a legislative kind; those who were concerned in passing, promulgating, or enforcing the orders, trusting to subsequent parliamentary protection, and taking on themselves the personal responsibility of the proceeding. In such cases, an act of indemnity afterward passed has relieved from liability those who advised the order or acted under it, and given compensation to all who suffered by its enforcement. This course was adopted 1766 with regard to an embargo on the exportation of corn, issued in consequence of a deficient harvest and prospect of famine. An important constitutional question was raised by the famous Orders in Council issued by Great Britain 1807 and 9, in reprisal for Napoleon's Berlin and Milan decrees: see CONTINENTAL SYSTEM. The Berlin decree, 1806, Nov. 21, declared the whole of the British islands in a state of blockade, and all vessels trading to them to be liable to capture by French ships. It also shut out all British vessels and produce from France and from all countries which gave obedience to the French. A decree soon afterward obliged all neutral vessels to carry letters or certificates of origin—that is, attestations by the French consuls of the ports whence they had sailed, that no part of the cargo was British. In retaliation for the Berlin decree, the British govt. issued, 1807, Jan. 7, an Order in Council, subjecting to seizure all neutral vessels trading from one hostile port in Europe to another with property belonging to an enemy. This order was at first extensively evaded, while the French made vigorous efforts to enforce the Berlin decree; the result was, that new Orders were issued by the British govt., 1807, Nov. 11, 21, declaring France and all states subject to the French to be in a state of blockade, and all vessels liable to seizure which were found to have certificates of origin on board, or which should attempt to trade with any of the ports of the world thus blockaded. Neutral vessels intended for France, or any other hostile country, were ordered, in all cases, to touch first at some British port, and to pay custom-house dues there, after which they were in certain cases to be allowed to depart for their destination; and vessels clearing from a hostile country were similarly to touch at a British port before proceeding on their voyage. 1807, Dec. 27, Napoleon's Milan decree was issued, which declared the whole British dominions in a state of blockade, and all countries were prohibited from trading with each other in any articles of British produce or manufacture. The Americans, and those of the public of Great Britain who were interested in the export trade, exclaimed loudly against the edicts of both powers, and the legality as well as the expediency of the Orders in Council were called in question in parliament. The result was, that an inquiry was instituted into the effect of the orders, from which no direct

result followed. But, in the mean time, 1808, Apr. 26, a new Order in Council was issued, limiting the blockade to France, Holland, a part of Germany, and n. Italy; and the order condemning vessels which had certificates of origin on board was rescinded. Subsequent orders introduced a system of furnishing licenses to vessels to proceed to hostile ports after having first touched and paid custom-house dues at a British port; no fewer than 16,000 of these licenses are said to have been granted. The legality of these Orders has been called in question, on the ground that they were more legislative than executive, so far as a fictitious blockade, where there is no actual blockading force present, is contrary to the law of nations; but the legality has been defended on the ground that they were issued in execution of the royal prerogative of declaring and conducting war. They are commonly believed to have added to the general distress, and to the check on manufactures produced by Napoleon's decrees; though, on the other hand, it has been maintained that they were essential to the effective prosecution of the war.

There are various matters connected with trade and the revenue as to which Orders in Council have been authorized by statute; parliament, in fact, delegating its legislative authority to the sovereign in council.

ORDINAL, a. *ŏr'dĭ-năl* [F. *ordinal*, ordinal—from L. *ordinālis*—from *ordo* or *ordĭnem*, order]: denoting order: N. in the *Eng. Chh.*, the service of ordination (see below). ORDINAL NUMBERS, numbers in succession, as first, second third, etc.

OR'DINAL: service in Episc. churches for ordination of ministers (see ORDERS, HOLY: ORDINATION.) The English O was drawn up by a commission appointed in the third year of Edward VI. (1550); and it was added to the *Book of Common Prayer*. It was slightly modified in the reign of Elizabeth, and was again revised by the convocation of 1661. The English O., in its general structure, resembles the ancient services used for that purpose, but is much more simple, and has some features—e.g., the numerous questions addressed to the candidates—peculiar to itself. There are separate services for the 'making of deacons' and the 'ordering of priests,' but these are practically joined in one, and used on the same day. The service for the consecration of bishops is altogether distinct The ordination takes place at one of the Ember seasons, and during the public service, after morning prayer and a sermon on the subject. It begins with presentation of the candidates by the archdeacon. The bishop inquires as to their fitness, and commends them to the prayers of the congregation. The litany is then said with special petitions for the candidates for each order; and the communion service commences with a special collect, epistle, and gospel. Between the epistle and gospel, the oath of supremacy is administered, and the candidates for deacon's orders are questioned by the bishop, and ordained. The gospel is read by one of the newly-ordained deacons. The candidates for priests' orders are then solemnly exhorted and interrogated, and the prayers of all present are asked for the divine blessing upon them. For this purpose a pause is made in the service for silent prayer. After this the hymn, *Veni Creator Spiritus* (Come, Holy Ghost, our Souls Inspire)—a composition of great antiquity, supposed by some writers to be as old as the 4th c.—is sung, and the candidates kneeling before the bishop, he and the assistant presbyters lay their hands upon the head of each, with the words, 'Receive the Holy Ghost for the office and work of a priest in the Church of God,' etc. The only other ceremony is the presentation of each candidate with the Bible in token of authority to preach; as the deacons had been before presented with the New Testament with authority to read the gospel. The service concludes with the administration of the sacrament of the Lord's Supper.—The ordination service in the Prot. Episc. Chh. in the U. S., differs only in minor details from that in the English Church. The consecration of bishops in the Chh. of England is performed by an abp., or some bp. appointed in his place, and two or more of his suffragans, and may take place on any Sunday or holy day. The service is very similar to that for the ordination of priests.

ORDINANCE, n. *ŏr'dĭ-năns* [OF. *ordenance;* F. *ordonnance,* an ordinance or rule—from L. *ordĭnans,* arranging, regulating—from *ordo,* order]: permanent rule of action; observance commanded; a law; a regulation; canon; religious rite or ceremony. OR'DINANT, a. *-dĭ-nănt,* in *OE.,* ordaining; decreeing.

ORDINANCE OF 1787: act passed by the 7th continental congress, 1787, July 13th, for the govt. of the terr. of the U. S. n.w. of the Ohio, and prescribing conditions under which states should be formed from it, the chief one being the total exclusion of slavery. In 1780, Oct., congress first provided for forming new states out of the N.W. Terr. In 1781, Jan. 2, Va. ceded to the United States all its terr. n.w. of the Ohio, but with a condition which made it of no effect. In Nov. an elaborate report to congress presented a plan for laying out the terr. for settlement. Early in 1783 Rufus Putnam and others formed a plan for a state w. of the Ohio, and Timothy Pickering of Mass. proposed that it adopt 'the total exclusion of slavery.' A 'pioneer ordinance' for colonizing the N. W. Terr. was brought forward 1783, June 5, by Theodorick Bland of Va., and seconded by Hamilton of N. Y. It was referred to a grand committee which had been named May 30. In Oct. congress resolved on a committee to report a plan of govt. for the terr. toward which many officers and soldiers were already looking for their future homes, as Washington advised in a farewell address, Nov. 2. 1784, Mar. 1, Jefferson, Monroe, and others of Va., gave a deed of cession of the rights of Va. within the terr.; and the same day Jefferson presented to congress a plan for the govt. of the terr. and its division into ten states, with a proviso that after 1800 neither slavery nor involuntary servitude should exist in any of them. Apr. 19 this proviso was stricken out, and Apr. 23 the ordinance (of 1784) was adopted, and remained in force three years. In 1786, Apr. probably, a new committee was raised for reporting on a govt. for the N. W. Terr., and Monroe, chairman, presented its report May 10; but no further action was had. Sep. 19 a new report was made, but not acted on before the 6th congress expired, Sep. 30. A new congress, 1787, Feb., included Madison, Richard H. Lee, Grayson, and Ed. Carrington, from Va. The project of 1786, Sep., was revived, 1787, Apr., and read a second time May 9, but there suspended, on a memorial presented by S. H. Parsons, agent of the Ohio Co., asking congress to promote the settlement of a state beyond the Ohio. May 11—July 4 lack of a quorum prevented action of congress, and July 5, Dr. Manasseh Cutler, another representative of the Ohio Co., arrived, and from July 6 took a leading part in securing the consent of southern members to favorable action. A new committee was named July 9, and reported an ordinance July 11, broadly providing for govt., colonization, etc., and for freedom of religion, security of contracts, public education, etc., but with no mention of slavery. July 13, at the second reading, a sixth special article was added to the ordinance, on motion of the scribe of the committee, Nathan Dane of Mass., but representing the views to which Grayson, Richard H. Lee, and Carrington, of Va., had assented, and which Dr. Cutler had especially urged on behalf of the Ohio Co.'s proposed plan for settling a state. The new article irrevocably excluded slavery, but authorized the

recovery of fugitive persons owing labor or service The ordinance thus finally shaped was passed by the votes of Ga., S. Car., N. Car., Va., Del., N. J., N. Y., and Mass.; the states of Penn., Conn., R. I., and N. H. not taking part because they had no members present. The sixth article had the effect to prevent the extension of slavery into Ind. and Ill., where otherwise it would have gone, and thereby gave to free soil a preponderance decisive of the conflict of north and south two generations later. It may perhaps be said that no piece of writing still in existence ever wrought so great results as this fragment pasted on the bottom of the second page of the original printed ordinance:

OR'DINARIES, or Honorable Ordinaries, in Heraldry: certain charges composed of straight lines, and in very common use, to which writers on heraldry had assigned abstruse symbolical meanings, but whose chief peculiarity seems really to be that they originally represented the wooden or metal fastenings of the shields in actual warfare. The O. are usually accounted nine—the Chief, Pale, Fess, Bar (or Pile), Bend, Bend Sinister, Chevron, Saltire, and Cross (see these titles).

ORDINARY, a. *ŏr'dĭ-nă-rĭ* [F. *ordinaire*, ordinary—from L. *ordinārĭus*, of or belonging to arrangement or order—from *ordo*, order: It. *ordinario*]: according to established order; customary; usual; of common rank or quality; plain; not handsome; common; of little merit: N. an ecclesiastical judge, usually the bishop (see Ordinary, below): in *Scot.*, a single judge; having power to decide cases either with or without a jury; settled establishment; certain charge found on a heraldic shield (see Ordinaries): a dining-place where the prices are fixed; the meal furnished; name applied to the chaplain of Newgate. Or'dinarily, ad. *-nă-rĭ-lĭ*, according to established rules or settled method. Ordinary seaman, one capable of the lower duties, but not expert or fully skilled; an inferior seaman. In ordinary, in constant service; statedly attending and serving; as applied to a ship of war, one laid up in harbor out of actual use, sometimes dismasted, and sometimes roofed over for protection from weather, while in dockyards near by their masts and gear lie ready for their immediate fitting for sea when required. Ordinary of arms, in *heraldry*, index of armorial coats, arranged, according to the leading charges in the respective shields, so as to enable any one conversant with heraldic language, on seeing a shield of arms, to tell to whom it belonged. A very imperfect ordinary for England is appended to Edmonson's *Heraldry:* one far more complete, Papworth's *Ordinary of British Armorials*, was pub. 1874.—Syn. of 'ordinary, a.': established; methodical; regular; mean; normal; inferior.

OR'DINARY: person, who, in virtue of his office, and in his own consequent right, is competent to do certain acts or to decide certain causes: in this sense, there are many functionaries who may be called thus. But the word in canon law, when used without additions, is understood to mean the bishop, who is the O. of his own diocese, and is competent of himself to do every act necessary for its government, and for ordering of the spiritual concerns of his flock. The jurisdiction of the O. is distinguished from 'extra-ordinary jurisdiction' which arises from some abnormal circumstances, and from 'delegated' jurisdiction which is imparted by the O. to another person to be exercised vicariously.

In English law, the Judge O. is entirely disconnected with the church. In Scotland, the Judge O. generally means the sheriff depute or substitute, who has ordinary jurisdiction in the county.—In those states of the American Union where such an office exists, its functions are assigned by the constitution and laws: in S. C. the office is judicial.

ORDINATE, a. *ŏr'dĭ-nāt* [L. *ordinatus*, regulated, set in order—from *ordĭnem*, order]: well-ordered; regular; methodical: N. in analytical geometry, the coördinate that is measured vertically.

ORDINATION, n. *ŏr'dĭ-nā'shŭn* [F. *ordination*—from L. *ordinātĭōnem*, a setting in order, an arranging]: established order or tendency consequent on a decree; sovereign appointment or allotment (as of God).

ORDINA'TION TO THE MINISTRY: act of setting apart ministers in the Christian church; also the service or ceremony pertaining to the act. The New Testament contains frequent reference to the specific ceremonial of 'imposition of hands' (Acts vi. 1-7, xiii. 1-4, xiv, 23; I Tim. iv, 14, v. 22; II Tim. i. 6). In the Roman, the Greek, and the other Eastern churches, this rite of Ordination is held to be sacramental, and its exercise is reserved, at least as regards the major orders (see ORDERS, HOLY), exclusively to bishops. In extraordinary cases, it was permitted to cardinals and to certain abbots to confer the minor orders. Considerable controversy exists among Rom. Cath. writers as to the essential portions (*Materia Sacramenti*) of the rite of Ordination. Some place it in the 'imposition of hands,' some in the 'presentation of the instruments' symbolical of each order. The controversy derives some importance from the diversity which exists between the Greek and Roman ceremonial; though Rom. Catholics maintain that the essential rites are contained alike in both ceremonials. As regards the *validity* of the rite of Ordination, the mere fact of its being conferred by a bishop suffices; but there is not any part of the Roman discipline more jealously guarded by laws than the administration of orders. The candidate can be *lawfully* ordained only by 'his own bishop' (*proprius episcopus*), or with the authority of his own bishop, which must be communicated to the ordaining bishop by what are called dimissorial letters. The candidate may be claimed by a bishop as by 'his own bishop' under any of four titles—of birth, of domicile, of benefice, or of connection by personal service; and if an Ordination be attempted without some one of these titles, heavy ecclesiastical penalties are incurred as well by the ordainer as by the ordained. On the part of the candidate himself, certain qualifications are required; and certain disqualifications created or propounded by the canon law, called *irregularities*, are held to render an Ordination in some cases invalid, and in all unlawful.

In the Church of England and other Reformed prelatical churches, the rules of the ancient canon-law are retained (with slight modifications in the United States), by which no one could be ordained without previous examination of his fitness, or who was disqualified by bodily infirmity, illegitimacy, immorality, or simony, or who was unprovided with a title (i.e., an appointment to serve in some church) which should provide him with

a maintenance: or who, being a candidate for deacon's orders, was under 20, and for priest's, under 24 years of age; but the age for admission to deacon's orders is changed to 23. A college fellowship is admitted as a 'title.' (For the ceremony of Ordination, see ORDINAL.) A person can be ordained only by the bishop in whose diocese he is to serve, except on *letters dimissory* from that bishop to another.

In other Reformed churches Ordination is performed by the presbytery, or by one or more ordinary ministers. Some small Prot. denominations have no ceremony of Ordination whatever. See CONGREGATIONALISM; PRESBYTERIANISM; EPISCOPACY; CLERGY; PRIEST; BISHOP; ORDERS, HOLY; ORDINAL; ROMAN CATHOLIC CHURCH; etc.

ORDNANCE, n. *ŏrd'năns* [an incidental application of *ordinance*, in the sense of arrangement or preparation: F. *ordonner*, to ordain, to dispose: It. *ordigno*, a machine]: general term applied to all things connected with artillery or guns, particularly the great guns; cannon; artillery (see CANNON; FIREARMS; GUN; HOWITZER; MORTAR; RIFLED ARMS; MACHINE GUN; ARMSTRONG, SIR WILLIAM; CARTRIDGE; PROJECTILE; GUN MANUFACTURE; GUNNERY; etc.). The uses of this word originated with the issue of ordinances in England regulating the manufacture of cannon and the supply of munitions of war. In its present meaning it includes not only cannon of all kinds, but small arms, hand arms, etc., and all supplies and equipments relating thereto. ORDNANCE DEPARTMENT, this department and its duties are fixed by U. S. statute. The department consists of a chief of ordnance, with a corps of officers, non-commissioned officers and privates. It makes contracts and purchases of ordnance and ordnance stores for the armies of the United States, and has charge of the inspection and proving of them, as well as of the construction of all cannon, carriages, ammunition wagons, traveling forges, and of every implement and apparatus for ordnance and the preparation of all kinds of ammunition and ordnance stores constructed, or prepared for the service, as well as the establishment of depots of ordnance and ordnance stores, in any part of the country where it may be deemed necessary. BOARD OF ORDNANCE AND FORTIFICATION, the board is organized by act of Congress, and consists of the commanding general of the army, an officer of engineers, an officer of ordnance, certain officers of artillery, and one civilian member nominated by the President and confirmed by the Senate. The board has power to provide regulations for the inspection of guns and material at all stages of manufacture necessary to protect fully the interests of the United States, and to provide such regulations concerning matters within its operations as shall be necessary to carry out, to the best advantages, all of its duties. It is also empowered to make needful and proper

purchases, investigations, experiments and tests, to ascertain the most effective guns, small arms, cartridges, projectiles, fuses, explosives, torpedoes, armor plates and other implements and engines of war, to purchase or cause to be purchased, under authority of the secretary of war, such guns, carriages, armor plates and other war material as may, in its judgment, be necessary in the discharge of its duty. ORDNANCE OFFICER, an officer who has charge of ordnance, ordnance supplies, etc. Such an officer is appointed for each command and military station. ORDNANCE STORES, stores pertaining to the ordnance department. ORDNANCE DEPOT, places where the ordnance supplies are stored for the necessary supply of troops. BUREAU OF ORDNANCE, the department which performs duties for the navy corresponding to that of the ordnance department for the army. ORDNANCE SURVEY, that survey in Great Britain under the direction of the government, and executed by Royal Engineers and civilians. Accurate charts are made, giving the extent and limit of estates, location of buildings, as well as the natural features of the country, with a view to the national improvement and transaction of public business.

ORDOVICIAN PERIOD. See PALEONTOLOGY.

ORDURE, n. *ŏr'dūr* [F. *ordure*, filth, ordure: OF. *ord*, dirty—from L. *horrĭdus*, horrid, filthy: It. *ordura*, filth]: dung; filth; excrements.

ORE, n. *ōr* [Ger. and Sw. *ader;* Norw. *aar;* Dan. *aare*, a vein: another derivation suggested is from AS. *âr;* OHG. *êr;* Goth. *ais;* L. *æs*, brass or bronze, ore; Icel. *eir*, brass]: properly the vein of metal—so called from the ore found in a thin band appearing in the section like a vein running through the rock; a metal as extracted from the earth combined with other substances—as mixed with mineral matters, ores receive the various names of matrix, gangue, vein-stone, or ore-stone. Any mineral or combination of minerals containing so much metal as to be profitably extracted, is reckoned by miners an ore. The proportion necessary is very various, according to the value of the particular metal and the facility or difficulty of *reducing* the ore. A rock containing only 1 per cent. of iron is never called an ore; one containing the same proportion of gold is a very rich ore. Metals rarely exist in ores in a pure or native state; they are almost always chemically combined with oxygen, sulphur, or other elements.

Ores present themselves in a multiplicity of forms and positions in the solid crust of the earth. Sometimes they are sprinkled through the whole mass of the rocks in which they occur, as is often the case with gold, tin ore, and magnetic iron ore. Sometimes they are deposited in regular parallel beds between the strata of other rocks, as in the case of many iron-stones and of cupreous schist. At other times, they occur in irregular lumps or concretions; or they fill up the fissures of other rocks,

forming veins, particularly silver, copper, and lead ores; or lastly, they are found in detritus, gravel, sand, and other alluvial deposits. This last form is evidently the result of disturbance and transport from some of the other positions above specified. And as the metallic parts of the mineral masses or rocks so disturbed and transported are the heaviest and are insoluble in water, they are more concentrated in these deposits than in their original position, and can therefore be extracted with greater advantage. Such deposits are called *washings*, from the metal being separated from the other débris by the process of washing. Gold and platinum are mostly got in this way in the Ural and Altai Mountains; and gold in California, Australia, and Guiana. Tin ore also is found in alluvial deposits in Cornwall, England, and in India. For the reduction of ores, see METALLURGY: also the titles of the several metals.

ORE, n. *ōr* [Dan. *ore;* AS. *ora*—comp. Icel. *eyrir*, eighth part of a mark]: a unit of value in Denmark, Sweden, and Norway; the one-hundredth part of a crown. The coin by this name is of the value of about a quarter of a cent.

OREAD, n. *ō'rĕ-ăd*, plu. O'READS, *-ădz*, or OREADES, *ŏ-rē'ă-dēz* [L. *orēăs* or *orēădem*, an Oread: Gr. *oros*, a mountain]: mountain-nymph: see NYMPH.

Ö'REBRO. See OEREBRO.

ORECTIC, a. *ō-rĕk'tĭk* [Gr. *orektikos*, pert. to appetite]: of or pertaining to desire or appetite: sometimes used to denote pertaining to the will.

ORE-DEPOSIT, n. *ōr-dē-pŏz'ĭt:* any metalliferous natural deposit having economical value: the deposit may be of any variety of form or of extent.

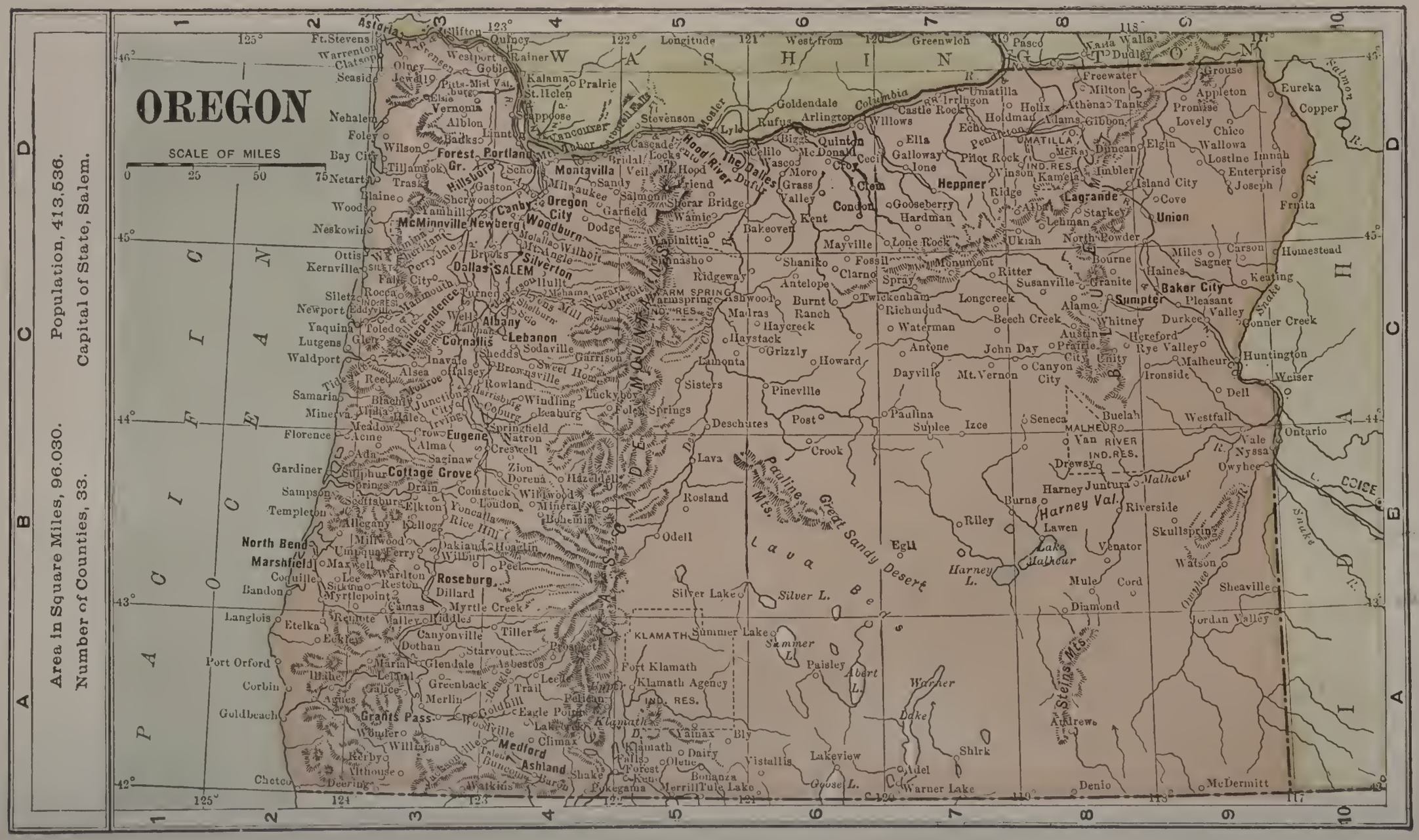
OREGON, *ŏr'ĕ-gŏn:* state; one of the United States of America; 20th in order of admission into the Union, being admitted 1859, Feb. 14; name Spanish, meaning 'wild thyme.'

Location and Area.—Oregon is bounded north by the Columbia River, which separates it for the most part from the State of Washington; east by the State of Idaho; south by Nevada and California; and west by the North Pacific Ocean. The state lies between lat. 42° and 46° 18′ N., and between long. 116° 33′ and 124° 25′ W. Its extreme length from east to west is 395 miles, and from north to south 278 miles. Its area is 94,560 square miles or 60,518,400 acres of land surface, and 1,470 square miles of water surface. It ranks seventh in size among the states. There are 32 counties in the state. The population in 1900 was 413,536. The capital is Salem.

Topography.—The Cascade Mountains, continuation of the Sierra Nevada range, divide the state into two parts, e. and w. Oregon. The e. division has an average width of 230 m., is sparsely settled, and its inhabitants are engaged principally in rearing cattle, sheep, and horses.

The w. division has average width 120 m., and comprises the most thickly populated and wealthiest portion of the state. From 40 to 70 m. from the coast is the Coast Range of mountains, averaging 3,000-4,000 ft. high, covered with fine forests, and sending numerous streams to the ocean. The Cascade Mountains are about 110 m. from the coast, average 6,000-7,000 ft. high, and have many notable peaks—e.g., Mt. Hood (11,225 ft.), Mt. McLaughlin (11,000), Mt. Jefferson (10,200), and the Three Sisters (9,420). Between the Coast and the Cascade Mountains are the Willamette, Umpqua, and Rogue River valleys; and between the Willamette and the Umpqua valleys is the low Callapooia range, from which to the California boundary the surface is diversified by low hills and by valleys, very fertile, and adapted to agriculture, fruit-growing, and grazing. The Willamette valley constitutes the wealthiest portion of Oregon, has an average width of 60 m., length 130 m., and contains about 7,800 sq. m., or 4,992,000 acres, all of which is highly fertile. It is drained by the Willamette river, which receives the Clackamas, Molalla, Pudding, Santiam, and McKenzie rivers, from the Cascade Mountains; and the Tualatin, Chehalem, Yamhill, La Creole, Luckiamute, Mary's, Long Tom, and Callapooia rivers, from the Coast Range. The Columbia is the main river in the state, has a total flow of 2,500 m., drains 245,000 sq. m., is navigable for deep seagoing vessels 120 m. from its mouth, and for river steamers 1,000 m., averages 2 m. in breadth, and is more than 6 m. broad at its mouth. The Willamette river is second in importance, receives the waters of 42 streams, is navigable for ocean steamers 112 m. from its mouth, and for river steamers 250 m., and is the largest tributary of the Columbia. Other important rivers are (n.) Des Chutes, John Day's, Umatilla, and Grande Ronde; (e) Snake and Owyhee; and (w.) Umpqua and Rogue. In the s. and s.e. are numerous lakes, including the Upper and Lower Klamaths, Goose, Summer, Albert, Warner's, Harney, Malheur, Salt, and Silver lakes.

Climate.—The climate of the w. division is mild and equable; average spring temperature 52°, summer 67°, autumn, 53°, winter 39°, average for year 52·75°; wet season Nov. 15—May 1, average rainfall 43·60 in., rain gentle, no torrents, few thunder-storms; hottest month July; days tempered by sea breezes, and nights cool. In the Willamette valley, spring and autumn mornings are foggy, summer warm and smoky, heavy rains in winter; in the Umpqua valley, the climate is delightful, occasional fogs in spring and autumn mornings, mild summer and winter temperature, with occasional showers in summer, rain and occasional snow in winter, and light winds through the year; in the Rogue River valley, many of the characteristics of the Umpqua valley prevail, with warmer summer and colder winter temperature, summer dry, winter with rain and snow; and in the lake region, the winters are very cold, with light rain-


OREGON
SCALE OF MILES
0 25 50 75
Area in Square Miles, 96,030.
Number of Counties, 33.
Population, 413,536.
Capital of State, Salem.
PACIFIC OCEAN
WASHINGTON
IDAHO
Longitude West from Greenwich
Astoria
Portland
SALEM
Eugene
Roseburg
Medford
Ashland
Grants Pass
Marshfield
North Bend
Coos Bay
Albany
Corvallis
Lebanon
McMinnville
Newberg
Oregon City
Woodburn
Silverton
Dallas
Hillsboro
Forest Gr.
Tillamook
Astoria
Warrenton
Clatsop
Seaside
Cannon Beach
Nehalem
Wheeler
Bay City
Netarts
Pacific City
Neskowin
Lincoln City
Otis
Kernville
Siletz
Toledo
Newport
Yaquina
Waldport
Florence
Reedsport
Gardiner
Sutherlin
Oakland
Drain
Yoncalla
Elkton
Sutherlin
Umpqua
Reedsport
Coquille
Bandon
Myrtle Point
Riddle
Canyonville
Glendale
Grants Pass
Cave Junction
Gold Beach
Brookings
Port Orford
Langlois
Agness
Illahe
Galice
Merlin
Wolf Creek
Glendale
Azalea
Myrtle Creek
Tiller
Dothan
Prospect
Crater Lake
Diamond Lake
Fort Klamath
Klamath Agency
Chiloquin
Klamath Falls
Bonanza
Malin
Tulelake
Lakeview
Paisley
Summer Lake
Silver Lake
Christmas Valley
Fort Rock
La Pine
Sisters
Redmond
Madras
Culver
Metolius
Warm Springs Ind. Res.
Grizzly
Haystack
Haycreek
Ashwood
Antelope
Shaniko
Fossil
Condon
Wasco
Moro
Grass Valley
Kent
Wapinitia
Bakeoven
Dufur
The Dalles
Hood River
Mosier
Lyle
Rufus
Arlington
Biggs
Celilo
McDonald
Cecil
Quinton
Ella
Galloway
Ione
Heppner
Ridge
Gooseberry
Hardman
Mayville
Lone Rock
Ukiah
Pilot Rock
Vinson
Umatilla Ind. Res.
Pendleton
Echo
Holdman
Adams
Athena
Weston
Milton
Freewater
Walla Walla
Dudley
Pasco
Kennewick
Irrigon
Boardman
Castle Rock
Willows
Columbia R.
Snake R.
Grande Ronde R.
Wallowa R.
Powder R.
Burnt R.
Owyhee R.
Malheur R.
Malheur L.
Harney L.
Harney Val.
Harney Lake
Alvord Desert
Steens Mts.
Pueblo Mts.
Pauline Mts.
Great Sandy Desert
Lava Beds
Abert L.
Summer L.
Warner Lake
Goose L.
Silver L.
Lake Albert
Lagrande
Union
Baker City
Sumpter
Huntington
Ontario
Vale
Nyssa
Owyhee
Jordan Valley
Sheaville
Watson
Skullspring
Riverside
Burns
Juntura
Harney
Lawen
Venator
Mule
Cord
Diamond
Riley
Egli
Paulina
Suplee
Izee
Seneca
Dayville
Mt. Vernon
Canyon City
John Day
Prairie City
Unity
Austin
Whitney
Durkee
Hereford
Rye Valley
Malheur
Ironside
Dell
Westfall
Van River Ind. Res.
Drewsy
Crook
Deschutes
Post
Lava
Howard
Lamonta
Pinevlle
Rosland
Odell
Redmond
Powell Butte
Tumalo
Bend
Alfalfa
Gateway
Terrebonne
Metolius
Culver
Madras
Richmond
Waterman
Beech Creek
Longcreek
Twickenham
Spray
Clarno
Ridgeway
Monument
Ritter
Susanville
Granite
Bourne
North Powder
Island City
Cove
Elgin
Wallowa
Lostine
Imnaha
Enterprise
Joseph
Promise
Lovely
Chico
Appleton
Grouse
Eureka
Copper
Haines
Sagner
Miles
Carson
Homestead
Keating
Pleasant Valley
Conner Creek
Weiser
Huntington
Ontario
Vale
Nyssa
Owyhee
Jordan Valley
Sheaville
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Riverside
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Enterprise
Joseph
Promise
Lovely
Chico
Appleton
Grouse
Eureka
Copper
Haines
Sagner
Miles
Carson
Homestead
Keating
Pleasant Valley
Conner Creek
Weiser

fall and considerable snow, and the summers are more pleasant and equable. In the e. division, the summers are warm, winters cold, with light rainfall and heavy snow, which is rapidly melted by the Chinook, a warm wind of great benefit to the region.

Geology.—The state has a varied geological structure. The Coast Range and Blue Mountains are of Eozoic formation; the Cascade ranges and the eastern part of the state, of volcanic, with its ridges and hills of obsidian; and the Pacific Coast. Willamette Valley, and part of the Umpqua Valley are of Tertiary formation. The Cretaceous fossil deposits are found in the upper valleys of Des Chutes, Crooked and John Day rivers, and the Grande Ronde Valley. The Glacial, Champlain, and Terrace periods are well represented. The metalliferous fields which have made California so famous are traced into Oregon. Gold is found in various places and successfully worked. Silver, copper, iron, nickel, cinnabar, and coal are also worked. There is a general lava and volcanic formation in the mountains of the state. In the cañon of the Snake river the rocks are ancient metamorphic granites, gneisses and mica-slate. In the southwest there is a belt of slate and serpentine. Generally throughout the state the soil is of volcanic origin, with alluvial deposits in the valleys, and is extremely fertile. In the central and southeastern portions of the state, the rainfall is very light, and the farming depends largely upon irrigation.

Zoology.—The grizzly bear, black bear, cinnamon bear, wolf, panther, coyote, catamount, deer, antelope, elk, wild cat, and mountain sheep have retreated to the mountains or disappeared altogether. Squirrel, raccoon, porcupine, beaver, otter, musk-rat, silver fox, marten, hare, and rabbit are among the smaller animals. The birds include the Cal. vulture, American swan, Canada goose, turkey buzzard, golden eagle, bald-headed eagle, fish-hawk, cormorant, pelican, gull, albatross, and many song and plumage birds. The leading fish are salmon, trout, halibut, sturgeon, herring, and smelt. Lobsters, crabs, clams, and oysters are abundant.

Agriculture.—In w. O. the soil is a rich, dark loam. The hills have a heavier soil and the mountains are suitable only for grazing. Irrigation has been a prominent factor in increasing the agricultural productiveness of the state. Altogether there are nearly 50,000 farms in the state, comprising over 15,000,000 acres, of which about one-third is improved land. The total value of all farm property, including lands, implements, buildings, machinery, and live stock, is well over $200,000,000. The principal crops are corn, wheat, oats, barley, rye, potatoes, hay, hops, and flaxseed. The fruit-growing industry is extensive and profitable, as is the cultivation of small fruits and miscellaneous vegetables. The state's floral products are excellent, while the splendid grazing land makes stock raising a very lucrative industry.

Manufactures.—O. has exceptional advantages for

manufacturing establishments in the extent and diffusion of natural water power. Altogether there are nearly 2,000 manufacturing establishments, with aggregate annual products, which are valued at about $75,000,000. The leading industries are lumber and timber products; flour and grist-mill products; slaughtering and meat packing; lumber and planing-mill products; canning and preserving fish; foundry and machine-shop products.

Fisheries.—The canning of fish ranks high among the industries of the state, being worth about $3,000,000 annually. This industry, which is almost entirely the canning of salmon caught in waters of the Columbia river and its tributaries, has its centre in the city of Astoria, and is carried on very largely by the Chinese. The industry dates back to 1866, and reached its height in 1883. It has of later years been necessary to protect this industry with legal restrictions. Mountain and lake trout and perch or pike are also abundant.

Forest and Timber Products.—The mountains and highlands are heavily covered with evergreens, yellow, sugar, and scrub pines, yellow and white fir, red and white cedar, several varieties of spruce, yew, juniper, tamarack, maple, alder, ash, and oak. In the valleys are cottonwood, willow, birch, aspen, poplar, dogwood, and wild cherry. The Oregon myrtle is a common tree. Altogether nearly 30 per cent. of O.'s area is timber land. Much of the timber land was burned at one time or another, but this is now being reforested with sturdy young trees, while a government reserve tends to conserve the forests of the state still further. The lumber and timber industry, in all its phases, is one of the most flourishing in O.

Minerals.—O. abounds in mineral wealth, but gold is the only product extensively mined. It is found mostly in the n.e., in the Blue Mountain region. Silver, lignite, coal, zinc, cinnabar, mercury, platinum, iridium, lead, antimony, iron, copper, magnetite, and nickel are also found here. The building stones are granite, sandstone, and limestone, while some returns are secured from clay products, mineral waters, and iron ore. The annual production of gold and silver is worth about $2,500,000.

Commerce and Transportation.—The largest export countries are Great Britain, China, and Japan. The principal port is Portland on the Willamette, 12 miles above its junction with the Columbia. Another port is Astoria, at the mouth of the Columbia itself. There are excellent harbors at Port Orchard, Rogue river, Coos Bay, Tillamook Bay, and Yaquima Bay. The annual value of merchandise imported is about $3,000,000, while the exports amount to about $12,000,000. O. has a total mileage of about 2,000 miles, the principal roads being the Union Pacific and Southern Pacific. O. has 570 miles of navigable waterfront, 300 m. on the Pacific Ocean and 270 along the Columbia river. The Willamette river is navigable in nearly all seasons 50-60

m. from its mouth and in the rainy season through the centre of the Willamette valley 120 m. The Yamhill river is navigable in portions of Yamhill, Washington, and Polk counties.

Finance and Banking.—The total assessed valuation of property is $860,000,000, the tax rate $2.50, and the bonded debt $1,460,000. There are about 75 national banks, over 100 state banks, and a few private banks, while Portland conducts a clearing house business.

Religion.—The strongest denominations in the state are the Roman Catholic, Methodist Episcopal, Regular Baptist, Disciples of Christ, Presbyterian, Congregational, Methodist Episcopal, South, Protestant Episcopal, and United Brethren.

Education.—O. spends about $2,500,000 a year in the maintenance of its public schools, in which there are well over 100,000 pupils enrolled, with about 4,500 teachers. There are, besides the regular public schools, private secondary schools, normal schools, colleges and universities, and schools of law, medicine, and technology.

Charities and Corrections.—At Salem are located the School for Deaf Mutes; the State Insane Asylum; the School for the Blind; the Boys' Reform School; and the O. State penitentiary. There is a Soldiers' Home at Roseburg.

History.—Among the earliest known voyagers to the w. coast of N. America were Cabrillo and Ferrelo, who reached lat. 43° (1543); Apostolos Valerianos, a Greek navigator, better known as Juan de Fuca, who discovered the strait which bears his name (1592); Vizcaino, who passed n. to lat. 43° (1603); Perez, who was at lat. 54° (1774); and Heceta, who, at lat. 48°, saw but did not enter the St. Roque (now Columbia) river (1775)—all representing Spain; Drake (1580), Cook (1778), and Vancouver (1793), representing Great Britain; and Robert Gray (q.v.), who discovered and explored St. Roque river, and changed its name to the Columbia (1791), representing the United States. Further international interest in the vast region was developed by the operations of Russian fur-traders and the exploring expedition sent out by the United States government under command of Capts. William Clarke (q.v.) and Meriwether Lewis (q.v.), 1805-6. These events led Spain, Great Britain, Russia, and the United States to claim the region on the grounds of discovery or occupation, while France regarded it as an extension of its Louisiana territory. The claims of Spain to exclusive control covered the coast country between lat. 42° and 55° n., and were asserted by a strong naval force. In 1789 Spanish armed vessels seized several English vessels in Nootka Sound (lat. 49° 30′ n.), and war between the two countries was averted by a treaty, 1790, which provided that English trading stations along the sound should be restored, the right of trade by each party guaranteed, and the landing by one party on coasts occupied by the other

prohibited. In 1803 the United States, by the purchase of the Louisiana territory, extinguished all French claims to the region; and 1819-22, by the Florida treaty, the claims of Spain—which all along had been the strongest—were reduced to the region s. of lat. 42° n. Thus the United States and Great Britain remained sole claimants. One of the first results of the Clarke-Lewis expedition was an attempt by John Jacob Astor to open the vast region to settlement, and to render American trade independent of the Hudson's Bay Co., which monopolized English trading interests in Canada, and was striving to control American trade also. He proposed, 1809, to establish a chain of trading posts from the great lakes to the Pacific, to plant a central depot at the mouth of the Columbia river, and to found a line of vessels between the w. coast of America and the ports of China and Japan. In 1811 he sent one expedition by land and another by sea, to seek business intercourse with the Indians along the Pacific coast, and established a fort and trading station at the mouth of the Columbia, since known as Astoria (q.v.). The war between the United States and Great Britain (1812-15) frustrated Astor's plans. His Astoria settlement was surrendered (1813) by his agent (treacherously, he charged) to the English, who renamed it Fort George, and held possession till 1818, when it was surrendered to the United States under the convention of Oct. 20.

The great controversy in regard to the n.w. boundary had its official origin in the second article of that convention, which was drawn to define the boundary between the Louisiana territory and British America. (See NORTHWEST BOUNDARY DISPUTE). The line was there fixed at lat. 49° n., from its intersection with the Lake of the Woods, to the Rocky Mountains. By virtue of the discoveries and explorations of Gray, Clarke, and Lewis, the United States claimed all the territory drained by the Columbia river (or n. to lat. 52°), and its commissioners were willing to compromise on lat. 49°, to the Pacific; but while the British commissioners agreed to consider that latitude as a basis, they insisted that the boundary-line on it should extend only to the Columbia river, and that from that point to the Pacific the river should form the line. This would have given the present state of Washington to British America. Failing to reconcile these claims, the convention provided that the territory w. of the Rocky Mountains should be open for ten years to the vessels and subjects of both countries, without prejudice to the claims of either. A second convention (1827) continued the joint occupation indefinitely, but provided that either party might abrogate it by giving the other one year's notice. Dissatisfaction with the settlement of the n.e.-boundary dispute by the Webster-Ashburton treaty, 1842 (see MAINE, *History*), attracted wide attention to the anomalous condition of the 'Oregon country,' and it soon became an important and exciting element in the politics of the day. (See

OREGON QUESTION.) A treaty agreement with Russia, providing that that country would not extend settlements below lat. 54° 40′, led many people to regard that line as the proper boundary, and gave rise to the memorable political cry, 'fifty-four-forty or fight.' While influential politicians in and out of the congress were demanding the occupation of the whole of Oregon, diplomatic negotiations for a settlement of the dispute were being conducted by the secretary of state and the British minister. 1846, Apr. 23, both houses of congress passed a bill authorizing the president to give the year's notice of the abrogation of the joint occupation. On June 6 the British minister agreed to accept lat. 49° as the boundary, to the channel between Vancouver's Island and the mainland, and thence down the middle of the channel and the Strait of Fuca to the Pacific, with free navigation of the channel and the Columbia river to both parties. A third convention was held June 12, the British offer was accepted, and ratifications were exchanged in London July 17. Subsequently a dispute arose over an attempt to determine the true water channel through the centre of which the line was to run. The United States claimed that the real channel was the Canal de Haro, and the British insisted on the Rosario Straits. By the treaty of Washington, 1871, both countries submitted the question to the emperor of Germany for arbitration, and he decided, 1872, in favor of the United States.

The first settlers from other states arrived 1832, and a missionary colony, led by Dr. Marcus Whitman and the Rev. Mr. Spalding, appointed by the American Board, made the first organized overland journey to the region 1834. Whitman soon discovered that the British were intent on preventing American settlements in the Oregon country; and, making a horseback journey to Washington, he gave information to the government concerning the value and accessibility of the region, that had great weight in determining the government to retain its possession. The Hudson's Bay Co. had previously spread reports of its inaccessibility, and had sought to discourage American settlements: all such reports were disproved by this ride of the prompt pioneer. Immigration increased steadily till 1848, when the gold excitement began drawing its settlers to California; but the passage by congress, 1850, of the 'donation law,' by which actual settlers could acquire 160-164 acres free, led to the registering of 8,000 claims, and the subsequent discoveries of gold in Oregon further stimulated settlement. In 1841 the settlers formed a code of laws for their government, and elected executive officers; 1843 and 4 elected executive and legislative committees; 1845 established a provisional government; and 1848, Aug. 14, were given by congress a territorial form of government. The Territory of Oregon, as organized, comprised all the United States territory w. of the summit of the Rocky Mountains and n. of lat. 42°. In 1853 the Territory of

Washington was organized, and comprised the 'district of Vancouver,' or all of Oregon n. of the Columbia river, toward the w., and of lat. 46°, toward the e. A state constitution was framed 1857, and by act of congress 1859, Feb. 14, the Territory was admitted to the Union as a state, after its e. part (now Idaho) had been annexed to Washington. From 1845 till 1855 a desultory warfare was kept up with the Indian aborigines, and a resumption of the same occurred in 1858, and again in 1866-8, when occurred the Shoshone war, and in 1864-73, when the Modoc war prevailed. Since 1875 the Indians have been confined on the reservations. Since 1890 congress has made numerous large appropriations for river and harbor improvements.

Government.—Under the provisional government 1843-5, adopted by the people 1843, July 5, the executive power was vested in a committee of three persons; the legislative power was vested in a committee of nine persons, elected by the qualified electors, giving to each district representation in ratio of its population, excluding Indians; the judicial power was vested in a supreme court, consisting of one supreme judge and two justices of the peace, and a probate court. Oregon had a provisional governor (1845-9) and seven Territorial governors (1849-59). The executive authority is now vested by the constitution in a governor, elected for 4 years; secretary of state, who is also auditor of public accounts, elected for the same term and at the same time; state treasurer, elected for the same term and at the same time; superintendent of public instruction; and the usual county officers. The governor must be 30 years old, a citizen of the United States, and a resident of the state for 3 years preceding his election. In case of his removal, death, resignation, or inability, his duties devolve on the secretary of state; and in case of his removal, death, resignation, or inability, while acting as governor, the executive duties devolve on the president of the senate till a governor is elected. The legislative authority is vested in a legislative assembly, comprising a senate of 30 members, elected for 4 years, and a house of representatives of 60 members, elected for 2 years: sessions biennial, in odd-numbered years, limit 40 days. Senators and representatives must be 21 years old, citizens of the United States, and residents of their counties or districts one year preceding their election. The judicial authority is vested in a supreme court with appellate jurisdiction, the court consisting of five judges, who are elected for six years. There are nine circuit courts, having civil and criminal jurisdiction, and appellate jurisdiction from the county courts. There are county courts, with one judge, elected for four years, who is also judge of probate. The circuit court judges are elected one third every two years. There are also United States district and circuit courts. Justices of the peace are elected in every township or mining district, and municipal courts may be created.

The successive governors, with their terms of service, are as follows: *Provisional*—George Abernethy 1845-49. *Terr.*—Joseph Lane 1849; John P. Gaines 1849-53; Joseph Lane 1853; George L. Curry 1853-59, excepting a few days' service, 1854, of . . W. Davis. *State*—John Whittaker 1859-62; Addison C. Gibbs 1862-66; George L. Woods 1866-70; Lafayette S. Grover 1870-77; S. F. Chadwick 1877-8; William W. Thayer 1878-82; Zenas F. Moody 1882-87; Sylvester Pennoyer 1887-95; William P. Lord 1895-99; Theodore T. Geer 1899-1903; George E. Chamberlain 1903-09; Frank W. Benson, 1909-10; Oswald West, 1910—.

Politics.—The constitution authorizes any male citizen of the United States, 21 years old, and 6 months a resident of the state, to be a voter, and any like foreigner who shall declare his intention to become a citizen one year before an election and shall have been a resident of the state for 6 months. New ballot laws, modeled on the Australian system, were adopted in 1891. Oregon has 4 electoral votes. Her votes for president and vice-president have been as follows: 1860, Abraham Lincoln and Hannibal Hamlin 3; 1864, Abraham Lincoln and Andrew Johnson; 1868, Horatio Seymour and Frank P. Blair, Jr.; 1872, U. S. Grant and Henry Wilson; 1876, Rutherford B. Hayes and William A. Wheeler; 1880, James A. Garfield and Chester A. Arthur; 1884, James G. Blaine and John A. Logan; 1888, Benjamin Harrison and Levi P. Morton; 1892, Benjamin Harrison and Whitelaw Reid; 1896, William McKinley and Garret A. Hobart; 1900, William McKinley and Theodore Roosevelt; 1904, Theodore Roosevelt and C. W. Fairbanks; 1908, William H. Taft and James S. Sherman.

Population.—(1850) 13,294; (1860) 52,465; (1865) 65,090; (1870) 90,923; (1880) 174,768; (1890) 313,767; (1900) 413,536; (1910) 672,765.

Bibliography.—Barrow, *Oregon, the Struggle for Possession* (1882); Bancroft, *History of the Northwest Coast* (1884), and *History of Oregon* (1888); Bulfinch, *Oregon and Eldorado* (1866); Gray, *History of Oregon* (1870); Greenbow, *History of Oregon and California* (1844); Mosely, *Oregon, Resources, Climate and Products* (1878); Mowry, *Marcus Whitman and the Early Days of Oregon* (1901); Nash, *Two Years in Oregon* (1882); Nicolay, *Oregon Territory* (1846).

OREGON CITY: Ore., county-seat of Clackamas county; on the Willamette river, and on the Southern Pacific railroad; about 14 miles south of Portland. The falls in the river, 40 feet in height, furnish extensive water-power which is used for the electric-light works and for the development of manufacturing industries. The chief manufactures are flour, lumber, woolen goods, soap, paper, pulp, and furniture. It has a House of the Good Shepherd, public and parish schools, and a public library. The city owns the waterworks. Pop. (1910) 4,287.

OREGON QUESTION, The: the Oregon question of boundary between the United States and Great Britain involved the right to the territory upon the Pacific coast of North America extending inland eastward to the Stony, now called Rocky Mountains, and bounded upon the south by the parallel of 42° north latitude, upon the north by the parallel of 54° 40′ marking the southern limit of what was formerly Russian America. The claim of the United States to this territory was based upon the discovery, 1792, May 11, of Captain Robert Gray of Boston, who, in the ship Columbia, entered the river called Oregon by the Indians. 'He passed its bar and anchored in the river, ten miles above its mouth,' and 'afterwards sailed up the river 12 or 15 miles and left it on the 20th of the same month, calling it Columbia after his ship.' (J. C. Calhoun.)

A second claim was based on the exploration of Meriwether Lewis and William Clark sent out with a party by the United States government, in 1804, across the newly purchased Louisiana territory. They followed the Missouri river to its headwaters, crossed the Rocky Mountains, reached the Columbia river and followed it down to the Pacific. They encamped on the north side of the mouth of the Columbia, on Cape Disappointment, wintering there, 1805-6, and returned to Saint Louis in September 1806. 'It was this important expedition which brought to the knowledge of the world this great river, the greater by far on the western side of this continent, with its numerous branches, and the vast regions through which it flows above the point to which Gray and Vancouver had ascended.' (Calhoun.)

Priority of settlement was claimed for the United States on account of the settlement made by the party sent out under the Company of which John Jacob Astor was the head. 'Early in the spring of 1811, they made their establishment on the south side of the (Columbia) river, a few miles above Point George.' (Calhoun.) Great Britain took this post and others in 1812 after the beginning of war between the United States and Great Britain. By the first article of the Treaty of Ghent, 1814, which terminated the war, the posts were restored to the United States, the formal transfer occurring in 1818.

Our last item of claim was based on the Treaty of Louisiana in 1803, with France, and the Treaty of Florida in 1819, with Spain. By the latter, Spain conveyed to the United States all her rights, claims and pretensions to the country west of the Rocky Mountains and north of the 42d parallel. By the Treaty of 1818, Oct. 20, between the United States and Great Britain, the boundary line between the United States and British America was fixed on the 49th parallel from the Lake of the Woods to the Rocky Mountains. West of the Rocky Mountains, the line was not defined, but it was agreed that the Oregon country with its harbors, bays and rivers, be open for the term of 10 years to the ves-

sels, citizens and subjects of either power. The boundary was left unsettled and the agreement above specified was renewed in 1827 except that the time was left indefinite and the agreement terminable at the discretion of either power upon a 12-months' notice to the other. The country in question was a wilderness traversed by the hunters and trappers of the Hudson's Bay Company and the Indians, the possession of which was not considered an issue of the first importance. In 1843 President Tyler's annual message called the attention of congress to the Oregon boundary and stated the United States claim as embracing the country from the 42d parallel to that of 54° 40′.

The claims of Great Britain were similar to the claims of the United States. In 1778, the English Captain Cook visited and explored the northwest coast of America from latitude 44° northward. In 1792, 1793, and 1794, Captain Vancouver, for the English, surveyed the coast and its adjacent islands. In point of 'accuracy and authenticity' these discoveries were said to be superior to those of any other country.

'In 1793 Mackenzie, a British subject, had crossed from the Rocky Mountains to the Pacific, exploring the upper waters of Fraser's river, which in process of time was traced to its junction with the sea near the 49th degree of latitude, thus forming in point of exploration a counterpoise to the exploration of that part of the Columbia which was first visited by Lewis and Clark.' (R. Pakenham.) An English expedition intended to anticipate the Astoria settlement, was a little late, not reaching Astoria till 1811, July. Great Britain denied the validity of the Spanish claim to the Oregon country, practically on the ground that she was so much stronger than Spain that Spain could not make good her claim. The above claims and counter claims, with various modifications, were discussed at times by the diplomatic representatives of Great Britain and the United States from 1826 to 1846.

The Oregon question as an issue in American politics was made prominent by a plank in the platform of the national convention of the Democratic party at Baltimore, the latter part of May 1844, which read, 'Resolved, That our title to the whole of Oregon is clear and unmistakable, that no portion of the same ought to be ceded to England or any other power, and that the reoccupation of Oregon and the reannexation of Texas at the earliest practicable period are great American measures which this convention recommends to the cordial support of the Democracy of the Union.' The words reannexation and reoccupation implied that the territory in question had belonged to the United States, Texas under the Louisiana purchase and Oregon by discovery, exploration, etc., till the United States left the claim to sovereignty over Oregon in abeyance by the convention of joint occupancy with Great Britain. It must be recognized that in 1844 the United States had no undisputed

sovereignty over the territory on the Pacific coast now belonging to the United States. Joint occupancy with Great Britain of the Oregon country was not sovereignty over it. The California country belonged to Mexico. If the sovereignty of the United States were to extend from ocean to ocean, that power must acquire the California country from Mexico or exclude England from Oregon. The settlement of the Oregon boundary had been discussed for some time previous to 1844 and it had been hoped that the treaty which was negotiated in 1842 between Mr. Webster and Lord Ashburton, fixing the line between Maine and Canada, would also fix the Oregon line, but such was not the case. James Buchanan, in a speech in the senate, 1844, March 12, upon a resolution requesting the president to give notice of the termination of the joint occupancy of the Oregon country, pointed out clearly that England leased that territory to the Hudson's Bay Company in December 1821 for 21 years and in 1838 renewed the lease for 21 years more; that the Hudson's Bay Company had 6 permanent establishments on the coast, 16 interior, and several migratory hunting parties, 6 armed vessels, one of them a steamer; that they hoped to keep British interests on the ascendant in the Pacific. Mr. Buchanan also showed that Great Britain was content to keep the *status quo* and that the only way to force her to act was to give the notice. The plank in the Democratic platform was considered decidedly aggressive in some sections of the country. As might have been expected, New England and the sections whose cities and shipping would be more at the mercy of the enemy in case of war were not so enthusiastic for an aggressive foreign policy as those states in the centre, west and south of the Union which were more remote from the 'firing line' and which were deeply interested to see the flag of the Union sweep through from 'sea to sea.' The discussions in congress revealed calculation of the probabilities of war as the result of the notice. It was urged that Ireland was hostile to England and there might be a rebellion. Far more important was the fact that England received nine tenths of her cotton from the southern United States, that war would cut off this supply and close the English mills with all the social distress involved, to say nothing of the loss of the market the United States afforded for English manufactured products. In 1844, one third of the foreign trade of the United States was with Great Britain. After Mr. Polk's nomination, it was brought out in the proceedings of congress in June 1844, that so far back as the session of 1828-1829, he had laid out a definite plan of policy for the United States, including giving the notice and taking the consequences. When, therefore, Mr. Polk was elected in 1844, November, the Democratic party considered its platform approved by the country and it proceeded to carry out its policy of territorial aggrandizement. The cry of '54° 40′ or fight' phrased the ultra aggressive sentiment on the part of the

United States looking to push its territory to the Russian line, while Great Britain seemed equally determined to force the line of the Columbia river. War with Great Britain might involve the loss to the United States of all the Pacific coast. Mr. Blaine in his *Twenty Years of Congress* attributes the emergence from a difficult situation to the foresight and ability of Mr. Calhoun and of Mr. Buchanan. These gentlemen as well as Mr. Clay and Mr. Webster, when occupying the post of secretary of state, had been willing to continue the line of 49° to the Straits of Fuca. There were serious objections to the Columbia river line. The most important of these, barring considerations of national honor and pride, was the fact that there were no good harbors in the territory left to the United States south of the Columbia, whereas, if the line ran, as it does at present, on the 49th parallel to the Straits of Fuca, all Puget Sound with its waters sheltered from the storms of the Pacific and its branches accessible to a very large territory, would belong to the United States. San Francisco harbor then belonged to Mexico. Within the United States, sentiment was divided. War with England would hurt the South seriously by cutting off her cotton market and possibly limiting what might become slave territory to the Southwest. The anti-slavery sentiment of the North had defeated Mr. Clay for the presidency for his willingness to compromise on an issue on which it would brook no compromise. President Polk was a friend of General Jackson and peace was not an idol at whose shrine Jackson worshipped. The influence of other public men looking toward peace, their interests and rivalries, were to be considered. The Administration escaped from its '54° 40′ or fight' position by taking the advice of the senate in advance of the treaty. This course, unusual and in some cases highly undesirable, shifted the responsibility for action upon the shoulders of the senate, at the same time allowing the secretary and Great Britain to feel that the instructed action of the secretary could not consistently be rejected by the senate. It cleverly rescued the Administration, for if the Whigs insisted upon the line of 54° 40′, they put themselves squarely upon democratic ground. If they were willing to compromise on 49° for the sake of peace, it would hardly seem reasonable to taunt the Democrats with cowardice for acting upon Whig advice. When the resolution of notice passed the House in February 1846 'the country at once became alarmed by the growing rumors that the resolution of the House was a direct challenge to Great Britain for a trial of strength as to the superior title to the Oregon country.' (J. G. Blaine.) The resolution, amended by the senate and given a conciliatory tone, passed congress 1846, April 23. By that time the Administration must have seen its future course clear, for by the middle of June the diplomatic representatives of Great Britain and the United States had come to an agreement which was ratified by the respective countries and proclaimed

in force in 1846, August. The line agreed upon was the parallel of 49° to the Straits of Fuca, thence following the middle, roughly speaking, of that Strait to the Pacific. War with Mexico broke out contemporaneously with the passage of the amended Oregon notice to Great Britain and as a result of the war with Mexico and the Oregon treaty with Great Britain, the United States acquired its present sovereignty over the great territory west of the Rocky Mountains with a frontage of some 1,500 miles on the Pacific.

OREGON ROBIN: the 'varied thrush' (*Merula nævia*) which represents the eastern robin in Oregon and northward to Alaska west of the mountains. It is dark slate-blue above and orange-brown in the lower parts, with a crescent of black on the breast, from the horns of which a line of black leads along the neck and through the eye. It makes its nest in bushes, and lays greenish blue eggs, clearly marked with spots and points of dark brown. It is a sweet singer.

OREGON STATE AGRICULTURAL COLLEGE: founded in 1870 at Corvallis. The four years' courses include agriculture, domestic science, mechanical, electrical, and mining engineering, and pharmacy, there are also a two years' course in mining, a two years' business course (added in 1901), and a winter course of four to six weeks in agriculture; and a preparatory department with a one year's course. The college is coeducational, and there are women on the faculty. The Experiment Station is connected with the college, though separately supported; and farmers' institutes are organized under supervision of the faculty. The income is derived chiefly from the land grant fund of 1862, and from federal and state appropriation; tuition is free; in 1906 the annual income amounted to $90,012. In that year there were 1,150 students in attendance, and 55 members of the faculty.

OREGON, UNIVERSITY OF: the state university chartered in 1872, and opened in 1876 at Eugene. Its organization comprises (1) the college of literature, science and arts, which offers courses in law, journalism, business, and pedagogy; (2) the college of science and engineering, with courses in civil, chemical, electrical, mining, and sanitary engineering; (3) the school of music; (4) the graduate school; (5) the school of law (founded in 1884); (6) the medical school (founded in 1887); the two latter are located at Portland; there is also a university academy. The bachelors' degrees conferred are A.B. and B.S. The university is coeducational, number of women students being about 30 per cent of the total. It is supported mainly by state appropriation; tuition is free; the income in 1906 was $95,000. The library (1906) contains 20,000 volumes; the students number 734, and the faculty 95.

ORE-HEARTH, n. *ōr'-hârth:* small rectangular blast-furnace, with hearth of cast-iron, used, with slight variations of form, in some countries.

OREIDE, *ō'rē-īd* or *ŏr'īd*, or OROIDE, *ō'rō-īd* or *ō'royd:* an alloy, a substitute for ormolu. There are two formulas for composing it. In the first, the ingredients are: copper, 100·0; tin, 17·0; magnesia, 6·0; sal-ammoniac, 3·6; quicklime, 1·80; argol, or unrefined tartar, 9·0. In the second, less brilliant than the former, zinc is substituted for the tin. The metals are first melted; the other ingredients, after being thoroughly incorporated together by powdering and mixing, are slowly added; and the whole is kept in a state of fusion for about an hour, and the scum removed from time to time.

O'REILLY, JOHN BOYLE: Irish-American author and journalist: b. Dowth Castle, County Meath, 1844, June 28; d. Hull, Mass., 1890, Aug. 10. He was an active member of the Fenian Society, in whose interests he enlisted in May 1863 in the 10th Hussars. Three years later he was tried for treason and sentenced to death, a sentence commuted to 20 years' penal servitude. From Dartmoor he was transported in 1867 to Australia, whence he escaped and made his way to Philadelphia, where he was naturalized. He removed to Boston almost immediately, and became editor of the *Pilot* in 1870 and part owner in 1876. He wrote some good verse, notably that on Australian themes: *Songs of the Southern Seas* (1873); *Songs, Legends, and Ballads* (1878); *America* (1882), and *In Bohemia* (1886); and in prose, *Moondyne*, a novel dealing with penal life (1879); *The Irish Question* (1886); *Ethics of Boxing and Manly Sport* (1888), and *Stories and Sketches* (1888).

OREL': thriving town of Great Russia, capital of the government of Orel; on the Oka, at its confluence with the Orlik, 226 m. s.s.w. of Moscow, 678 m. s.s.e. of St. Petersburg. It was founded 1566, as a stronghold in defense of what was then the Russian frontier, against the inroads of the Tartar tribes of the Crimea. Its importance as a fortress ceased after the annexation of Little Russia, and it then became a commercial town. The town owes much to its advantageous position on a navigable river in the midst of the most fertile provinces of Russia. The railways from Moscow to Odessa, on the Black Sea, passes through Orel, and the Vitebsk line affords direct railway communication with the port of Riga; thus its export trade has been greatly promoted. It is the seat of a bishop, and contains numerous churches; its houses are mostly of wood. There is an important ferry over the Oka. The chief manufacturing establishments in the town are yarn and rope factories. The principal articles of export are cereals and hemp. 1848, June 7, Orel suffered severely from a conflagration, which destroyed 1,237 houses, 4 bridges, and a number of granaries. Pop. about 70,000.

ORENBURG, *ō'rėn-bûrg:* Russian govt. in the Ural region, partly in Europe, partly in Asia; between the govts. of Tobolsk on the n.e. and Samara on the s.w.; 73,600 sq.m. The govt. is divided into four districts—Orenburg, Verchne Uralsk, Ovsk, and Troitsk and Tchelabinsk; cap. Orenburg (q.v.). Till 1865, O. comprised the whole of what is now the govt. of Ufa (q.v.); but in that year the part of O. n.w. of the Ural mountain range was organized into the new govt. The populations, the surface, soils, flora, and fauna of this extensive country are most various. The province is one of the most elevated in the empire; yet it contains extensive low-lying tracts and steppes. It is traversed by numerous navigable rivers, by which and by canals it is in communication with the Caspian and Baltic Seas, and with the Arctic Ocean. The main streams are the Bielaia (running into the Kama, tributary of the Volga), Toboel, Ural. As many as 2,300 larger and smaller lakes lie within the frontiers. Of the whole area, about three-tenths are forest, half is waste land, and only about a twentieth part is cultivated. The inhabitants are Russians, Bashkir, Tartar, and Kirghis tribes, Kalmucks and certain Finnish peoples, with a few Germans. Trade is chiefly with Bokhara, Khiva, Tashkend, and the Kirghis; exports are gold, silver, and other metals, corn, skins, and manufactured goods; imports, cattle, cotton—the demand for and supply of which were greatly increased by the civil war in the United States—and the other articles of Asiatic trade. The imports are either disposed of to Russian merchants in the custom-house on the frontier, or are carried by Asiatic traders into Russia, and sold at the great national market of Nijni-Novgorod. There are numerous iron and copper works, as well as valuable gold diggings, belonging to the crown and to private individuals. The salt mines are valuable. There is a small-arms factory on a large scale, and a few other factories. Cattle-breeding is very extensive. The number of horses in O. is larger than in any other Russian province. The s. frontiers are defended, at intervals of 12 or 15 m., by fortified settlements, inhabited by Cossacks; those on a larger scale surrounded by a bulwark and a moat. This line of forts extends over a frontier of 2,000 m. eastward to the boundaries of China; the series from the mouth of the Ural to the Tobol, known as the O. line, occupied by more than 242,000 Ural and Orenburg Cossacks. The region of which O. forms part was originally called Bashkir-land, and became subject to the Czar of Moscow 1556. Besides the towns giving name to the governmental districts, the only other place of consequence is Mijask. Pop. of the govt. (1897) 1,609,388.

O'RENBURG: town on the e. frontier of European Russia, cap. of the govt. of O., on the river Ural, 1,393 m. s.e. of St. Petersburg. The town, which dates from 1742, suffered from a conflagration 1879. It is the centre of the gov.-generalship of the govt. of O., has an excellent custom-house, and has extensive trade with Khirghis and other Asiatic tribes. It imports cotton, silk-stuffs, and

shawls from Bokhara, Khiva, and Tashkend; tea (brought mostly on camels) from China; and sheep and cattle from the Cossacks and Khirghis. The sheep are killed in autumn for the fat and skins, which are purchased by Russian merchants. Grain, skins, and metals are principal exports. In the neighborhood is the very rich rock-salt mine of Iletsk. At O. the Ural is frozen from Oct. till March. Pop. (1897) 72,740.

O'RENBURG GUM: exudation from the trunks of larch trees which have been injured by forest fires. It is collected in Siberia and other portions of Russia, and forms an article of export. It is soluble in water, slightly saccharine and resinous, sometimes used for food, and is largely employed as a substitute for gum-arabic.

ORENSE, *ō-rĕn'sā* (anc. *Aquæ Calidæ Ciliorum*, or *Aquæ Originis*): city of Spain, cap. of the province of O., in Galicia, near the frontier of Portugal, on the left bank of the Minho. O. contains interesting ecclesiastical edifices. It is highly reputed for its hot sulphurous springs, *Las Burgos*, which issue—three in number—almost boiling from a granite rock in the w. part of the town. The baths of O. were known to the Romans, and were in repute among the Goths. O. has manufactures of linen, leather, and chocolate, and a large trade in hams, which are in demand throughout Spain.

OREODAPHNE, *ō-rē-ō-dăf'nē:* genus of trees of nat. order *Lauraceæ*, called sometimes MOUNTAIN LAUREL. The fruit is succulent, partly immersed in a deep thick cup formed of the tube of the calyx. *O. opifera* is native of countries on the lower Amazon. A volatile oil obtained from the bark is used as a liniment, and when kept for a short time deposits a great quantity of camphor.—*O. cupularis* is a very large tree with strong-scented wood, whose bark yields the cinnamon of Mauritius: it grows also in Bourbon and Madagascar.—*O. fœtens*, native of the Canaries, has wood (*Til-wood*) of disagreeable odor. *O. bullata*, found at the Cape of Good Hope, also is remarkable for the disagreeable odor of its wood, the *Stink-wood* of the colonists; but it is hard, durable, beautiful, takes an excellent polish, and is used in ship-building.

ORESTES, *ō-rĕs'tēz:* hero of Greek mythology. The story of his deeds is related by Homer and amplified in the tragedies of Euripides, Sophocles, and Æschylus. He is represented as the son of Agamemnon and Clytemnestra. In obedience to a command of the Delphic oracle he slew his mother and her lover Ægisthus in order to avenge the murder of his father. As a punishment for this crime he lost his reason and was driven by the Furies to various lands. He returned to Delphi and besought assistance from Apollo whose order he had obeyed. The latter was unable to help him, but referred him to Minerva at Athens, where he was tried before 12 judges. Their vote being a tie, the goddess gave the casting vote for acquittal. The Furies were propitiated, and O. succeeded to his father's throne. There are several other versions of the myth.

OR'FA, or UR'FAH: see EDESSA.

ORFILA, *or-fē'lâ*, MATEO JOSÉ BONAVENTURA: physician and chemist, recognized founder of the science of toxicology: 1787, Apr. 24—1853, Mar. 12; b. Mahon in Minorca. His father, a merchant, intended that his son should follow the same pursuit; but young O. showed so strong predilection for the study of medicine, that all thoughts of a mercantile career were dismissed, and he was sent to the medical schools of Valencia and Barcelona, so distinguishing himself in the latter school that the junta of the province resolved to defray the expense of his further education in Paris, on condition of his returning to Barcelona to fill one of the chairs in their medical school: accordingly O. departed for Paris 1807. The junta were prevented from fulfilling the agreement by the outbreak of war with France; but O. made many friends in Paris, and was enabled to continue his studies. 1811, Oct., he received the degree Doctor of Medicine, and immediately began a private course of lectures on chemistry, botany, and anatomy, which, with his successful practice, soon rendered him famous. In 1813 appeared the first ed. of his famous work on poisons, *Traité des Poisons tirés des Règnes Mineral, Végétal, et Animal*, or *Toxicologie Générale* (Paris). The work was commended by the Institute, and rapidly passed through a number of editions. In 1816, he became court physician; 1819, was made a citizen of France, and became prof. of jurisprudence; and 1823, was transferred to the chair of chemistry, to which, 1831, was added the deanship of the faculty. His prosperity was now at the full; his lectures and works were reckoned masterpieces; and his geniality and accomplishments made him a social favorite. From 1834, he was a member of the council of public instruction, and procured the passing of many useful measures, such as the creation of secondary medical schools. He also organized the clinical hospital, founded a new botanic garden, and a museum of comparative anatomy now known by his name. The republic of 1848 ended his career of popular favor; and his chagrin is said to have hastened his death, which occurred at Paris. His great work on toxicology is a vast mine of information, the result of indefatigable research. It is well written, and exhibits the accuracy of language equally with the sound judgment of its author. His other works are of less importance, being mostly compilations;. the chief are—*Elémens de Chimie appliqués à la Médecine* (Paris 1817; 8th ed., 1851); *Traité de Médecine Légale* (1823–25; 4th ed., 1847); *Mémoires sur Plusieurs Questions Medico-légales* (Paris 1839). He contributed largely to various journals, dictionaries, encyclopedias, and periodicals. O. both created the science of toxicology and raised it to a high degree.

ORFORD, Earls of: see WALPOLE.

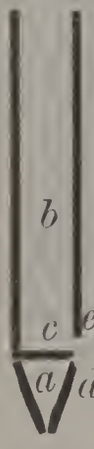
ORGAN, n. *ŏr'găn* [F. *organe*—from L. *orgănum;* Gr. *orgănon,* an instrument: It. *organo:* comp. Gr. *ergon,* a work]: a part of the living body by which some action, operation, or function is carried on (see ORGAN—ORGANISM—ORGANIC): an instrument or means of communication, as of a political party—generally said of a newspaper; in *botany,* any defined subordinate part of the vegetable structure, external or internal, as a cell, a fibre, a leaf, a root: wind musical instrument (see below). ORGANIC, a. *ŏr-găn'ĭk,* or ORGAN'ICAL, a. *-ĭ-kăl,* relating to living organs; produced by living organs. ORGAN'ICALLY, ad. *-lĭ.* ORGAN'ICALNESS, n. *-nĕs,* state of being organical. ORGANIZE, v. *ŏr'găn-īz,* to form, as a living body, with suitable organs; to establish with parts that may co-operate together; to arrange the several parts of a plan of action or work, and appoint the proper persons to carry it out. OR'GANIZING, imp. OR'GANIZED, pp. *-īzd:* ADJ. formed with organs; constructed of parts co-operating with each other. OR'GANIZABLE, a. *-ī-zā-bl,* capable of being organized. ORGANIZATION, n. *ŏr'găn-ĭ-zā'shŭn* [F.—L.]: the act of forming or arranging parts in such a manner as to enable them to co-operate together; the parts when so arranged; structure; form. OR'GANISM, n. *-ĭzm,* a body possessing an organic structure. OR'GANIST, n. *-ĭst,* performer on the organ. ORGAN BUILDER, constructor of organs. ORGAN-LOFT, small gallery where the organ stands in some churches. ORGAN-POINT, or PEDAL-POINT, in *music,* a bass note sustained through a series of chords, with only the first and last of which it is in harmony. The sustained note may be the dominant or tonic, and sometimes occupies an upper part instead of the bass. ORGANIC BODIES, such bodies as possess life and sensation. ORGANIC CHEMISTRY, that department of chemistry which treats of the composition and properties of bodies that have or have had life, or which deals with substances containing carbon; as distinguished from *inorganic* chemistry, which treats of bodies that never had life, or in which carbon does not exist. ORGANIC DISEASE, a disease in which the structure of an organ is evidently affected or altered. ORGANIC REMAINS, the fossil remains of animals or vegetables. ORGANIC LAWS, laws which form or concern the fundamental parts of the constitution of a state.

OR'GAN: musical instrument played by finger-keys, and in general partly also by foot-keys, and consisting of a large number of pipes of metal and wood, made to sound by a magazine of wind, accumulated by bellows, and admitted at will by the player. The following description is necessarily restricted to the most fundamental arrangements of this very complicated instrument. In cathedrals and large churches, the organ comprises four departments, each in most respects a separate instrument with its own mechanism, called respectively the *great-organ,* the *choir-organ,* the *swell-organ,* and the *pedal-organ.* Each has its own clavier or keyboard, but the different claviers are brought into

juxtaposition, so as to be under the control of one performer. Claviers played by the hands are called *manuals;* by the feet, *pedals.* Three manuals, belonging to the choir, great, and swell organs respectively, rise above each other like steps, in front of where the performer sits; while the pedal-board by which the pedal-organ is played is placed on a level with his feet. A few very large organs have more than three manuals. The condensed air supplied by the *bellows* is conveyed through wooden tubes or trunks to boxes, called *wind-chests,* one of which belongs to each department of the O. Attached to the upper part of each wind-chest is a *sound-board,* an ingenious contrivance for conveying the wind at pleasure to any individual pipe, or pipes, exclusively of the rest. It consists of two parts, an *upper board* and an *under board.* On the upper board rest the *pipes,* of which a number of different quality, ranged behind each other, belong to each note. In the under board is a row of parallel *grooves,* running horizontally backward, corresponding each to one of the keys of the clavier. On any of the keys being pressed down, a valve is opened which supplies wind to the groove belonging to it. The various pipes of each key stand in a line directly above its groove, and the upper surface of the groove is perforated with holes bored upward to them. Were this the whole mechanism of the sound-board, the wind, on entering any groove, would permeate all the pipes of that groove; there is, however, in the upper board, another series of horizontal grooves at right angles to those of the lower board, supplied with *sliders,* which can, to a small extent, be drawn out or pushed in at pleasure by a mechanism worked by the *draw-stops* placed within the player's reach. Each slider is perforated with holes, which, when it is drawn out, complete the communication between the wind-chest and the pipes: the communication with the pipes immediately above any slider being, on the other hand, closed when the slider is pushed in. The pipes above each slider form a continuous set of one particular quality, and each such set of pipes is called a *stop.* Each department of the O. is supplied with a number of stops, producing sounds of different quality. The *great-organ,* some of whose pipes appear as show-pipes in front of the instrument, contains the main body and force of the organ. Behind it stands the *choir-organ,* whose tones are less powerful, and more fitted to accompany the voice. Above the choir-organ is the *swell-organ,* whose pipes are inclosed in a wooden box, with a front of louver-boards like Venetian blinds which may be made to open and shut by a pedal, for producing *crescendo* and *diminuendo* effects. The *pedal-organ* is placed sometimes entire behind the choir-organ; and sometimes divided, and a part arranged on each side. The most usual compass of the manuals is from C on the second line below the bass staff to D on the third space above the treble staff, and the compass of the pedals is from the same C to the D between the bass and treble staves. The real compass of notes is, as will be seen, much greater.—For production of the notes, see SOUND.

Organ-pipes vary much in form and material, but be[illegible]

to two great classes, known as *mouth-pipes* (or *flute-pipes*) and *reed-pipes*. A section of one of the former is represented



in the figure. Its essential parts are the *foot a*, the *body b*, and a flat plate *c*, called the *language*, extending nearly across the pipe at the point of junction of foot and body. There is an opening, *d e*, in the pipe, at the spot where the language is discontinuous. The wind admitted into the foot rushes through the narrow slit at *d*, and, in impinging against *e*, imparts a vibratory motion to the column of air in the pipe, the result of which is a musical note, dependent for its pitch on the length of that column of air, and consequently on the length of the body of the pipe: doubling the length of the pipe obtains a note of half the pitch, or lower by an octave. This is the general principle of all mouth-pipes, whether of wood or of metal, but subject to considerable diversities of detail. Metal pipes have generally a cylindrical section; wooden pipes, a square or oblong section. A mouth pipe may be stopped at the upper end by a plug called a *tompion*, the effect of which is to lower the pitch an octave, the vibrating column of air being doubled in length, as it has to traverse the pipe twice before making its exit. Pipes are sometimes half stopped, having a kind of chimney at the top. The *reed-pipe* consists of a reed placed inside a metallic, or occasionally a wooden, pipe. This *reed* is a tube of metal, with the front part cut away, and a tongue or spring put in its place. The lower end of the spring is free, the upper end attached to the top of the reed; by the admission of air into the pipe, the spring is made to vibrate, and, in striking either the edge of the reed or the air, produces a musical note, dependent for its pitch on the length of the spring, its quality being determined to a great extent by the length and form of the pipe or bell within which the reed is placed. When the vibrating spring does not strike the edge of the reed, but the air, we have what is called the *free reed*, similar to what is in use in the Harmonium (q.v.). To describe the pitch of an organ-pipe, terms are used derived from the standard length of an open mouth-pipe of that pitch. The largest pipe in use is the 32-ft. C, which is an octave below the lowest C of the modern pianoforte, or two octaves below the lowest C on the manuals and pedal of the organ: any pipe producing this note is called a 32-ft. C pipe, whatever its actual length may be. By a 32-ft. or 16-ft. stop is meant that the pipe which speaks on the lowest C on which that stop appears has a 32-ft. or a 16-ft. tone.

The *stops* of an O. do not always produce the note properly belonging to the key struck; sometimes they give a note an octave, or, in the pedal-organ, even two octaves, lower, and sometimes one of the harmonics higher in pitch. *Compound* or *mixture stops* have several pipes to each key, corresponding to the different harmonics of the ground-tone. There is an endless variety in the number and kinds of stops in different organs; some are and some are not continued through the whole range of manual or pedal. Some of the more important stops get the name of *open* or

stopped diapason (a term which implies that they extend through the whole compass of the clavier); they are usually 16-ft., sometimes 32-ft., stops; the *open diapason* chiefly of metal, the *close* chiefly of wood. The *dulciana* is an 8-ft. manual stop, of small diameter, so called from the sweetness of its tone. Among the reed-stops are the *clarion*, *oboe*, *bassoon*, and *vox humana*, named from real or fancied resemblances to these instruments and to the human voice. Of the compound stops, a frequent one is the *sesquialtera*, consisting of four or five ranks of open metal pipes, often a 17th, 19th, 22d, 26th, and 29th from the ground-tone. The resources of the O. are further increased by appliances called *couplers*, by which a second clavier and its stops can be brought into play, or the same clavier can be united to itself in the octave below or above.

Organs are now tuned usually on the equal temperament: see TEMPERAMENT. The notation for the organ is the same as for the pianoforte, in two staves in the treble and bass clefs; but in old compositions, the soprano, tenor, and alto clefs are used.

The history of the O. in its early period is greatly indebted to the famous *Syntagma Musicum* of Michael Pretorius—a very rare work, represented in English libraries by only two copies, and tracing the development of the O. from the primitive forms to the largest instruments known at its date of publication (Wittenberg and Wolfenbüttel 1615–20, 4to, 3 vols., appendix of 42 plates). Instruments of a rude kind, comprising more or less of the principle of the organ, seem to have existed in antiquity. Vitruvius (about B.C. 14; transl. by Newton, London 1771–91; Wilkins, London 1813) mentions a hydraulic O., but his description is not very intelligible. The O. is said to have been introduced into church music first by Pope Vitalian I. 666. In 757 a great-O. was sent as a present to Pepin by the Byzantine emperor, Constantine Copronymus, and placed in the church of St. Corneille at Compiègne. Soon after Charlemagne's time, organs became common. In the 11th c., a monk named Theophilus wrote a curious treatise on organ-building. Two very simple forms in the early middle ages were the *regal* and the *positif*, the former so small that angels were sometimes represented playing with the right hand on the keys of the instrument held in the left. A famous O. built for the cathedral at Halberstadt 1361 is described in *Syntagma Musicum*. But it was not till the 15th c. that the O. began to be anything like the noble instrument which it now is. The family of the Antignati, in Brescia, had a great name as organ-builders in the 15th and 16th c. Immense improvements were made in the 16th c.; and in the 17th and the earlier half of the 18th many of the most celebrated instruments on record were made in Germany, Holland, France, and England. For many years the O. in the church of St. Bavon, at Haarlem, built by Christian Müller 1735–38, had the reputation of being the largest in the world. It was 50 ft. broad and 103 ft. high. Those at the church of St. Laurent, Rotterdam, the cathedral at Ulm, and the monastery at Weingarten, were nearly

as large. In France, large organs were built for Notre Dame de Paris, the church of St. Eustache, and the cathedrals of Rheims and Toulouse. The best O.-builders in England in the 16th, 17th, and 18th c. were Antony Duddyngton, Thomas Dallam, Robert Dallam, Harris, Bernhardt, Schmidt (naturalized German, known in England as Father Smith, and the most famous O.-builder in London), Ralph Dallam, John Loosemore, Thomas Harris, Renatus Harris, Abraham Jordan, and his son of the same name, Thomas Schwarbrook, Renatus Harris, Jr., John Harris and John Byfield, Sr., Richard Bridge, Parker, John Schnetzler, and Samuel Green.

The Puritanism of the civil war, in its stern reaction against old abuses, doomed organs to destruction; and by an ordinance 1643, Aug. 23, for abolishing superstitious monuments, and a second ordinance 1644, May 9, the demolition or removal of church-organs was ordered for all England; and during 16 years this act was in force. Some organs were removed into private keeping, and some escaped altogether. A portion of the Puritan party declared against the use of any instrument of music in any Christian believer's house; but Cromwell held no such views, and found great content in a fine O. removed from Magdalen College, Oxford, and set up at Hampton Court. At the Restoration 1660, O.-builders of German birth, or who had been in exile abroad, as Schmidt (Father Smith) and his two nephews, were encouraged to renew O.-building in England. Till this time the organs consisted only of flue-stops of the foundation species (except the twelfth), and presented no mixtures, reeds, or doubles, and no pedals. Schmidt's first work 1660 introduced such novelties as compound, flute, and reed stops, and the echo. Ralph Dallam introduced compound and trumpet stops at St. George's 1661. Loosemore, at Exeter, introduced a remarkable feature in the double open diapason, consisting of 14 pipes, some being the largest yet made in England. The temple-O. built by Schmidt, in competition with Harris, had three complete manuals and other notable 'rarityes,' which made it a great success, and led to his building the St. Paul's O , consisting of great and choir organs, and echo, at £2,000 for the inside only, Sir Christopher Wren providing the case. A device of Harris at this time was that of stops made to act 'by communication,' on two different manuals. The O. with which Renatus Harris replaced one built by his father, in Salisbury Cathedral, showed, for the first time in England, 4 manuals, and had 50 stops, including a great-O. of 15 independent stops, a second great-O. of 13 borrowed stops, a choir-O. of 7 stops, and an echo-O. of 11. The Jordans introduced the swell at St. Magnus 1712, but with very limited compass and capacity; and four years later, Schwarbrook adopted at St. Chad's the device of a few treble stops attached to the choir-manual and inclosed in a swell-box. The same artist attached a harp, lute, and dulcimer to his great work at St. Michael's, Coventry; but owing to the difficulty of keeping the strings and action

in order, these features were removed 1763. The St. Dionis O. of R. Harris, Jr., was the earliest to contain a French-horn stop, and that of Harris and Byfield the first in England provided with an octave coupler. Parker's O., 1749, was specially remarkable for having four quarter-notes in each octave; and at its opening, Handel conducted the music given. The Lynn O. of Schnetzler was the first to contain a dulciana. It had one in the choir, and one in the swell. The two organs of Green, 1789 and 90, extended the compass of the swell, and inclosed the entire great-O. in a general swell. Pedals, which were known in Germany more than 400 years ago, were introduced into England in an O. made by G. P. England 1790, for St. James, Clerkenwell. They were an octave only in compass. From this date they became frequent. In 1809 J. C. Bishop effected the improvement known as composition pedals, to which has been added the modification known as the fan, adapted to easy alteration of the composition. Bishop introduced also the concussion bellows, 1825, in the O. at the Covent Garden Theatre Royal. This artist's O. at St. James, Bermondsey, was the most complete GG pedal-O., both as to compass and stops, that had then been made. It had a left-hand-side key-board for a third player (the rolling bass part), besides two players at the manuals. In 1827 Joseph Booth used for an O. at Attercliffe, near Sheffield, what he called puff-valves, ingeniously devised to establish pneumatic agency and make the wind-power of the instrument an aid in playing it. In 1832 C. S. Barker invented the pneumatic lever, wishing to apply it to the newly built Yorkminster O., to overcome the difficulties of a touch too heavy for human muscles. Lack of funds prevented his doing anything at York; but 1837 Cavaillé-Coll & Co., great French builders to whom Barker went, adopted the invention for the great-O. that he was building for the abbey church of St. Denis, near Paris. The action of this device relieves the key from the combined resistance of the main pallets, the coupling movements, and the heavy wind-pressure, and permits adjusting the touch to any degree of elastic resistance pleasant to the performer. C. S. Barker, of London, erected in Paris, 1867, an electric O. of his invention, introduced into England, under a patent of 1868, Jan., covering devices for playing the manual and pedal organs, for coupling the various manuals as well as the pedals, either in the unison, or in the octave and sub-octave, and for commanding the large traps in the wind-trunks, known as ventils; to which was later added an arrangement for drawing the stops. In 1868 Bryceson added a perfectly new form of pallet which offers no resistance in opening; and later he made other improvements, including an arrangement for using attenuated air instead of pressure, and at the same time Henry Willis patented a device for using exhaust and power alternately for actuating a 'floating valve' in connection with a novel arrangement of draw-stop action. Among the electric organs erected or reconstructed by Bryceson are those at St. Michael's, Corn-

hill, London; St. George's, Tufnel Park; St. Augustine's, Highbury, etc. The pneumatic tubular transmission system, as a substitute for the long tracker movements, etc., in large or separated organs, was turned to practical account first in 1867, in an O. shown at the Paris Exposition. Henry Willis recognized its importance, and used it with improvements in the St. Paul's O. 1874. Bryceson, T. Hill, and others followed. The first piece of mechanism devised for blowing the bellows, and increasing or decreasing the speed of the supply, was the hydraulic engine of Joy and Holt, in which a column of water, admitted alternately to the top and bottom of the piston, is the source of the motion of a cylinder similar to that of an ordinary steam-engine. Thomas Duncan patented the Liverpool water-metre, consisting of two cylinders, with pistons and slotted piston-rods working a short crank-shaft. Gas-engines also are used for blowing organs.

Organ-building in America.—The story of the organ in America begins with the instrument selected by Handel in London, and presented to King's Chapel in Boston by Thomas Brattle 1713. It is said that the prejudice against the organ was such that it was left unpacked more than a year. May it not have been that the unpacking was delayed by lack of a suitably qualified person for putting it in place and tuning it for service? The instrument was small, of a single manual, and with limited compass of pedals. It remained in King's Chapel until 1756, when it was sold to St. Paul's Church, Newburyport, Mass. In 1836 it was transferred to a new field of service, St. John's Church, Portsmouth, N. H. Here it was used in its original form until about 1860, when the available parts of it were incorporated in a more modern instrument by the Messrs. Hook.

The first builders of organs in America all were self-taught. With insufficient examples for inspection, and with no theoretical treatises to guide them, these men evolved organ-mechanism anew, and often hit on clever mechanical devices. They made their own pipes and voiced them by guess, the results being very crude. The first of these enterprising builders was Edward Broomfield, Jr., of Boston, whose work is characterized in the following terms by the Rev. Thomas Price in the *Panoplist:* 'As he was well skilled in music, he, for exercise and recreation, has made a most accurate organ, with two rows of keys and many hundred pipes, his intention being 1,200, but died before he completed it. The workmanship of the keys and pipes, surprisingly nice and curious, exceeding anything of the kind that ever came here from England; . . . And what was surprising was that he had but a few times ever looked into the inside work of two or three organs that came from England.' Here we have the whole story between the lines: the builder an amateur, self-taught, working for his own satisfaction. During the revolutionary war, the pipes of the organs were melted for bullets, a circumstance doubly significant—of the little esteem in which the instrument was held, and the desperate straits

to which the colonists were reduced. In 1752 Thomas Johnston built an organ for Christ Church, Boston; likewise another for the Episc. church at Salem, with one manual and six stops.

The first regular building of organs in America on a commercial basis was that by William M. Goodrich, whose work was so successful that during his active career as builder, 1805–33, only three foreign organs were imported. One of these, and no doubt the largest, was that imported for Old South Church, Boston, 1822, from the house of Elliot in London. It cost, erected in the church, $7,128. Shortly afterward, Ebenezer Goodrich, brother of the preceding Goodrich, set up in organ-building on his own account. About 1807 Thomas Appleton, apprentice and journeyman with William G odrich, established an organ factory with Ebenezer Goodrich. Later the firm name was Hayto, Babcock & Appleton, and their factory was in Milk st., Boston.

In 1827 the first of existing firms was organized, Elias and George G. Hook commencing business in Salem, removing to Boston 1832. In 1855 F. H. Hastings was engaged with them, the firm having already built 155 organs, including many of the largest at that time in the country. The firm of Hook & Hastings was the first to feel the effects of the importation of the great-organ for Boston Music Hall 1864. This instrument, built by the firm of Walcker, of Ludwigsburg in Würtemberg, was the largest in the country for many years; and though lacking the facilities of manipulation now in use, it was the first organ heard in America possessing first-class appointment of stops, good string-toned stops made of pure tin or with only slight alloy, and with mechanical appliances representing the condition of the German art at the time. This instrument had more than 100 speaking stops. The progress toward a better style of building was helped by the return of several young Americans from thorough studies abroad—Prof. John K. Paine in 1861, Eugene Thayer about 1867, Dudley Buck 1866, Samuel P. Warren 1865, Clarence Eddy 1872. These masters of the instrument introduced the legitimate music of the German school, and established an entirely different standard of completeness in the pedal-organ especially. Previously, motives of economy had led to the construction of instruments having 'short' stops, running only to tenor C, leaving the bass to be supplied by a single bass-stop, which naturally was too loud for the soft passages, and too soft for the full organ. The pedal frequently had but an octave and a half of compass, even in instruments of considerable size. During this entire period until 1872, the house of Hook & Hastings remained foremost among American builders. Among their largest instruments are those in the Cathedral of the Holy Cross, Boston, three manuals, 83 stops; Music Hall, Cincinnati, four manuals, 96 stops; and Tremont Temple, Boston 1880, four manuals, 65 stops. George H. Hutchins, a very progressive graduate from the Hooks, has also constructed a number of large and fine organs. Wil

liam A. Johnson, of Westfield, Mass., began organ-building about 1840. He was self-instructed, but had natural genius for the art; and after building in the style then prevalent in this country, began about 1865 to work for a higher standard. He has erected a very large number of instruments, many of them of first-class appointment, tone, and mechanism. Among his best organs are those in Central Music Hall and Second Presb. Church, Chicago. William H. Johnson, son of the preceding, has been associated with his father in the business since about 1860: he is one of the best voicers in the country. The organs of this firm number more than 500. Geo. Jardine & Sons, New York, established 1836, have distinguished themselves by the production of many fine instruments; among the best being that in St. Patrick's Cathedral, New York, 60 stops; St. George's Church, Prot. Episc., New York, 80 stops; Brooklyn Tabernacle (Presb.), 70 stops. Henry Erben (1801–84) established a business in New York 1835, and for nearly half a century held a most distinguished and honorable position among American builders: many large rich-toned organs in New York and vicinity were his work. This enumeration necessarily omits all names except those most widely known; many others were meritorious, but it is believed that none who left a personal mark on the history of the art are here omitted.

The most remarkable chapter in the history of American organ-building is that contributed by the house of Roosevelt, of New York. In 1872 Hilborne L. Roosevelt, a young man with financial means, liberal education, and high ideals, entered on the profession of organ-building, aiming from the first at a high standard rather than immediate commercial success. The works of this house attracted general attention first at the Centennial Exhibition 1876, where a large instrument was heard. The Roosevelt improvements have almost revolutionized the art of organ-building, and have placed the best American instruments above those of any other part of the world in respect to bringing their resources under the control of the organist. The first of these inventions was the Roosevelt wind-chest, having a valve for every pipe, thus affording all the advantages of the German 'poppett' valves, without their defects; rendering the speaking of the organ as prompt as a piano, and the touch of the keys about as light as that of the pneumatic lever. This invention adds materially to the first cost of the instrument, but its advantages and its independence of the weather are likely to make it universal. His next great improvement was a system of 'composition' pistons or pedals, so contrived that any combination of stops can be set upon either piston belonging to the group in a few seconds, and released with equal ease. This device permits the player to arrange a dozen combinations or more, needed in an elaborate piece, and bring them into use as needed, without removing the fingers from the keys, or interrupting the rhythm. He introduced a very ingenious application of electric action, employing it to actuate the valves operating pneumatics, whereby parts of the or

gan can be widely scattered without impairing promptness of speech or certainty of manipulation. Very remarkable effects are rendered possible by this mechanism, as applied in all the large organs of Roosevelt manufacture. The Roosevelt wind-chest has no 'sliders,' a ventil controlling the admission of wind to the several stops. He therefore employed pneumatic tubes for communicating between the draw-stop and the stop, rendering this part of the action much lighter, as well as prompt, and making it impossible for a stop to be brought only half 'on.' The pneumatic lever, invented by Barker with Cavaillé-Coll 1836, Roosevelt modified by operating it on the exhaust principle, quickening its action. He also instituted an entirely new order in the department of expression. In place of limiting the expressive capacity of the instrument to the stops inclosed in the 'swell-box,' he added swells to the choir and solo organs, and inclosed most of the loud stops of the great-organ itself in boxes capable of being operated as swells. In this way the boldness of the tone of the full organ is perhaps somewhat sacrificed, but its softness and capacity of musical effect are very much increased. His voicing has been distinguished for its musical quality and truth to the standard of the several stops. These improvements have met considerable opposition from the older style of builders; but there is little doubt that the organ of the future will contain most or all of them. Roosevelt's theories have had a number of brilliant illustrations on a large scale. Among his more noteworthy works are the organs in the Garden City Cathedral, Long Island (1879–83), having 115 speaking stops, disposed as follows: great-organ, chancel division 18, tower 13, total 31, swell-organ, chancel 14, tower 13, total 27; choir-organ, chancel 10, chapel 13, total 23; solo-organ, tower 7; echo-organ (played from solo-clavier) 7; pedal organ, chancel 12, tower 5, chapel 2, echo 1, total 20—total 115. Another remarkable work of Roosevelt is in Grace Church, New York, where was a sweet-toned organ by Erben, built 1830, which for its excellence it was desirable to incorporate in the new work. Roosevelt erected a new organ in a room built adjacent to the chancel, with the console in the chancel itself: the echo-organ was placed above the ceiling, connected with the keys by electric action, and by the same means the old organ was brought under control of the organist sitting at the chancel key-board, about 150 ft. away. The total stops of this instrument number 71, and the mechanical accessories are complete. Hilborne Roosevelt died 1888, at the age of 42, having accomplished a greater number of improvements in the mechanism of the organ in his brief career than any other man in the previous two centuries. His work was carried forward by his brother, Frank Roosevelt, whose largest production to date (1890) is the organ in the Chicago Auditorium. All the features mentioned above as peculiar to the Roosevelt system are illustrated in this instrument, probably the most complete concert-organ in the world. It is in seven divisions. The pipes of the great, swell, solo, choir, and pedal

organs stand in the organ-chamber at the left of the stage. The echo-organ is above the ceiling. Four stops of powerful intonation are placed in a gallery above the stage, for supporting the chorus in operatic performances, where choral effects are desired. The wind-pressure ranges from three inches to six and one-half inches, the latter being that of the solo-organ. Electric motors actuate the bellows. All the pipes of the swell, solo, choir, and echo organs are inclosed in swell-boxes, as also are most of those of the great. The tone of this instrument is considered as fine as the mechanical appointment is complete.

About 1850 Henry Ward Poole, of Boston, completed one of the most interesting of all attempts, hitherto, at solving the problem of perfect intonation for instruments of fixed scales, and at the same time retaining the control of chromatic relations, modulation, and all the good points of the tempered scale. His instrument proposed to play in perfect tune in all keys as far as five sharps and five flats, and to afford perfect modulation from one key to another without impairing the accuracy of the intonation anywhere. The instrument had 12 keys to the octave, and was played on the principle that a piece of music is always in one key at a time, and modulates to another by passing through a chord common to both keys, the old and the new. The pedal key-board of this organ was arranged in fifths, ascending and descending from middle C. Projecting through the middle of the wooden key was a small brass modulating key, which, being touched, connected the key-board with pipes belonging to the scale of this key. When a modulation was made, the modulating pedal of the new key was pressed while the hands were holding one of these neutral chords, and on coming upon the next following chord the necessary pipes were found connected so that the organ played in perfect tune. Two of these instruments were made by the aid of W. F. Alley, of Newburyport, Mass., enthusiastic organ-builder. The first was erected in the Church of the Unity (the Rev. James Freeman Clarke's), Boston, where it was used ten years; but Mr. Poole having removed to the City of Mexico, there was no person left capable of putting it in order again, and eventually it was taken down and stored, since which it has been lost sight of. The second instrument stood in the factory at Newburyport, never having found a purchaser. It was small, of one manual and about nine stops. The tone was very beautiful, and the value of the improvement may be judged from the fact that the trumpet and open diapason together made an extremely rich and satisfying effect in the full chord of the ninth, which on an ordinary instrument would be intolerable. Mr. Poole made an addition to musical theory by introducing the true harmonic seventh, ratio 7 : 4 to the root, in the full chord of the dominant seventh and ninth—the first time that this chord was ever knowingly used in music. The organ completely solved the problem of perfect intonation so far as relations of fifths were concerned; modulations by thirds, however, were not always perfectly done. No

organ-music with obligato pedal parts could be played on it, because of the irregular arrangement of the pedal keys. This feature, however, was not essential, Mr. Poole's theory being that the extreme low notes should be used only for fundamentals of the harmony. The mechanism of the instrument by means of which the changes were made from one key to another (his so-called 'selectors') was very clever. His theories were published at length in Silliman's *American Journal of Science* (2d series, IX., pp. 68–83, 119–216, on 'Perfect Intonation in Music'). In the same periodical, 1867, July, and 1868, Apr., he published two articles on his enharmonic key-board. He died in the City of Mexico 1890.

For a full account of the structure of the O., see Hopkins and Rimbault, *The Organ, its History and Construction* (Lond. 1855). Rink's *Praktische Orgelschule*, Leipzig, v. y., is the best work on organ-playing. See also Dr. Stainer's *The Organ* (1877).

ORGANDY, n. *ŏr'gan-dĭ* [Fr. *organdie*, book-muslin] : a very fine translucent dress-goods, often having figured patterns.

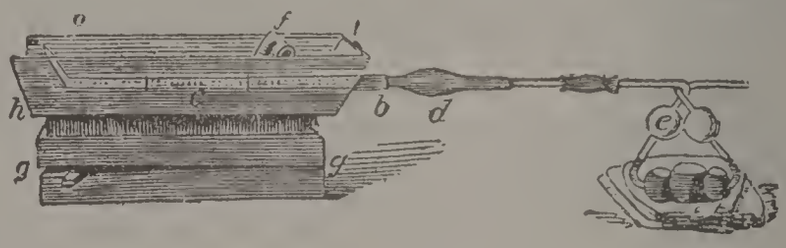
ORGAN'IC ANALYSIS: determination of the proximate constituents of a complex organic substance, and determination especially of their qualitative and quantitative composition. When a complex organic substance is submitted to chemical examination, the first point is to determine its *proximate* constituents, i.e., the several definite compounds of which it is made up. Opium, e.g., is thus found to have as its proximate constituents meconic acid, morphia, codeia, and 10 or 12 other substances. The modes by which these proximate constituents are separated are various; the chief being the action of certain solvents, such as ether, alcohol, and water, which extract some of the materials and leave others undissolved. Thus ether is the special solvent of fatty and waxy matters, resins, and camphors; alcohol dissolves the same substances with less facility, but on the other hand takes up many substances insoluble in ether; while water, which scarcely acts on the above-named matters, dissolves saccharine, gummy, and starchy matters, and salts of organic acids. The proximate constituents being thus determined, the next point is to determine their qualitative and quantitative (or ultimate) composition; and it is to these processes—especially the last—that the term *organic analysis* is usually restricted.

Qualitative Analysis.—It is known (see ORGANIC COMPOUNDS) that the ordinary ingredients for which we must seek are carbon, hydrogen, oxygen, nitrogen, and sulphur. *Carbon* and *hydrogen* may be simultaneously detected by burning the compound (which must be previously well dried) in a glass tube in contact with oxide of copper, which readily yields up its oxygen. The carbon is thus converted into carbonic acid, which if passed into baryta water forms a white precipitate of carbonate of baryta; and the hydrogen is converted into water, which collects in drops in a small cooled receiver attached to the tube. Carbon may be usually recognized also by the black residue which almost always remains on burning an organic matter, especially in a narrow test-tube in which there is little air. The presence of *nitrogen* may in most cases be readily ascertained by heating a portion of the substance in a test-tube with an excess of hydrate of potash, when a distinct odor of ammonia is perceived. *Sulphur* is detected by igniting the compound with hydrate of potash and nitre, whereby sulphuric acid is formed; and phosphorus and arsenic may be detected by the same means The presence of *oxygen* cannot, as a general rule, be directly determined.

Quantitative Analysis.—The first attempts to determine the quantitative composition of organic bodies were made more than half a century ago, by Gay Lussac and Thenard. The process originally proposed by them has been modified and improved by various chemists, especially by Berzelius, Prout, and Liebig, and it is owing mainly to the great simplifications introduced by the last-named chemist, and to the consequently increased facility of conducting an ultimate analysis, that knowledge of the

composition of organic bodies has so vastly enlarged in recent years.

The operation is always effected by causing complete combustion of a known weight of the body to be analyzed, in such a manner that the carbonic acid and water formed in the process shall be collected, and their quantities determined, from which, of course, the carbon and hydrogen which they respectively contain may be readily calculated. The apparatus required for the analysis of a compound containing carbon, hydrogen, and oxygen



a. *b*. the combustion tube; *c*, the central portion, in which the mixture to be analyzed is placed; *d*, the bulb-tube, containing chloride of calcium; *ee*, Liebig's potash apparatus; *f*, a movable iron screen; *gg*, bricks supporting *hh*, the furnace.

only, consists of (1) a *combustion tube*, of hard white Bohemian glass, having a diameter of half an inch or less, and a length of 14 to 18 inches. One end is drawn out in a point and closed, while the edges of the other (or open) end are made smooth by fusion in the blow-pipe flame. (2) A thin sheet-iron furnace, in which the tube is placed and supported during combustion. (3) A small light tube (which may be either a bulb-tube, as in the figure, or a U-tube), which is filled with fragments of spongy chloride of calcium to absorb the watery vapor that is driven through it; and (4) Liebig's bulb-apparatus, containing a solution of potash of specific gravity 1·27, for the purpose of absorbing the carbonic acid. The chloride-of-calcium tube is connected by a well-dried perforated cork to the open extremity of the combustion tube, and by a little tube of flexible caoutchouc, secured by silk cord, to the potash apparatus.

In performing an analysis a little freshly prepared oxide of copper is first introduced into the combustion tube, then a mixture of about 5 grains of the substance to be analyzed, with an excess of the oxide, while the tube is lastly filled to within an inch of its open mouth with the oxide alone. The tube is then placed in the furnace, which may be heated with charcoal or gas. Red-hot charcoal is now placed round the anterior part of the tube, containing the pure oxide of copper, and when this is red-hot, the fire is slowly extended toward the further extremity by shifting the movable screen shown in the figure. When the tube has been completely heated from end to end, and no more gas is disengaged, the charcoal is gradually removed from the further extremity of the tube, and the point of the latter broken off; after which a little air, freed from moisture and carbonic acid, is drawn through the whole apparatus, to secure any carbonic acid and

watery vapor remaining in the tube. The parts are then detached, and the increase of weight of the chloride of calcium tube and of the potash apparatus is determined by an accurate balance. Gas furnaces of various construction have now taken the place of the charcoal furnaces, and several minor improvements and refinements have been introduced, but the method remains in all essential points what Liebig made it. The following analysis of crystallized cane-sugar illustrates this:

	Grains.
Quantity of sugar employed, ...	4·750
Potash apparatus, after experiment. . . .	781·13
" " ", before experiment, . . .	773·82
Carbonic acid, ...	7·31
Chloride of calcium tube, after experiment, .	226·05
" " " , before experiment,	223·30
Water, ...	2·75

7·31 grains carbonic acid = 1·994 grains carbon; and 2·75 grains water = 0·3056 grains hydrogen: or in 100 parts of sugar, carbon, 41·98; hydrogen, 6·43; oxygen, by difference, 51·59.

For the methods of determining other elements quantitatively, such as nitrogen, chlorine, sulphur, phosphorus, etc., consult the various works on organic analysis, especially those of Liebig, Fresenius, and Rose.

ORGANIC BASES: principal elements of organic substances. The remarks following, supplementary to the article ALKALOIDS (q.v.), refer (1) to the classification of organic bases, (2) to their formation.

(1) From the fact that nearly all artificial organic bases are (as shown below) actually constructed from ammonia, and that, whether artificially or naturally formed, they exhibit the property of basicity, which is a leading characteristic of ammonia, chemists have been led to refer organic bases generally to the typical body ammonia, and to regard them as being constructed on or derived from the simple type NH_3. Berzelius believed that all the alkaloids actually contained ammonia as an ingredient of their composition, a view now untenable; and it is to Liebig that we are indebted for the idea that they are derivatives of ammonia; in other words, amidogen bases or ammonia in which an equivalent of hydrogen is replaced by an organic radical. The subject has been thoroughly worked out by Dr. Hofmann, who originally proposed to classify these bodies under the heads *amidogen*, *imidogen*, *nitrile*, and *ammonium* bases; but afterward adopted the terms *primary amines*, *secondary amines*, and *tertiary amines*, in preference to amidogen, imidogen, and nitrile bases—the word *amines* being applied to all organic bases derived from ammonia (NH_3). The amines may be (1) *monamines*, (2) *diamines*, (3) *triamines*, (4) *tetramines*, (5) *pentamines*, according as they are constructed on a single, double, treble, quadruple, or quintuple molecule of NH_3. The present illustrations of the meaning of these terms are confined to the monamines, both because they form the most important group, and because they are much more

readily elucidated than the other groups, which are extremely complicated in their composition. *Monamines* are constructed on the simple type of ammonia, H_3N. In *primary monamines* one of the atoms of hydrogen is replaced by an organic radical, R; hence their general formula is RH_2N. Ethyl-amine $(C_2H_5)H_2N$, or C_2H_7N, is an example. In *secondary monamines* two of the atoms of hydrogen are replaced by two atoms of either the same or different radicals. Hence their general formula is RR′HN, where R and R′ may be the same or different radicals. Examples are $(C_2H_5)_2HN$, or $C_4H_{11}N$, and methyl-ethyl-amine, or diethyl-amine $(CH_3)(C_2H_5)HN$, or C_3H_9N. In *tertiary monamines* the three atoms of hydrogen are replaced by three atoms of the same or different radicals; their formula therefore is RR′R″N, when R, R′, R″ may or may not differ from one another. Trimethylamine or $(C_2H_3)_3N$, or C_3H_9N, and methyl-ethyl-phenyl-amine, or $(C_6H_3)(C_2H_5)(CH_5)N$, or $C_9H_{13}N$, afford examples of the radicals being all the same and of their being all different. This last example affords a good illustration of the fact, that though the modern nomenclature of organic chemistry includes long and apparently complex words, these words to a great degree represent the composition of the substance which they are used to indicate; methyl (CH_3), ethyl (C_2H_5), and phenyl (C_6H_5), mainly contributing to form methyl-ethyl-phenyl-amine.

(2) Although all attempts at forming in the laboratory those alkaloids that naturally exist in plants, e.g., morphia, quinia, and strychnia have hitherto failed, a large number of organic bases have been prepared by artificial means, such as: *a*. By the destructive distillation of organic bodies containing nitrogen. Thus, in the preparation of coal-gas, four at least of these compounds are obtained—viz., aniline, picoline, leukol (or quinoline), and pyridine. *b*. By the distillation of certain nitrogenous compounds with caustic potash. In this way aniline is obtained from indigo. *c*. By the combination of ammonia with the aldehydes and with certain volatile oils which possess the properties of aldehydes. Thus acetic aldehyde yields dimethyl-amine, and oil of mustard yields thyosinamine. *d*. By the substitution (by the action of strong nitric acid) of one atom of nitrogen dioxide (NO_2) for one atom of hydrogen in certain hydrocarbons. *e*. By the processes of fermentation and putrefaction. Thus wheaten flour yields by putrefaction trimethyl-amine, ethyl-amine, and amyl-amine. The famous synthesis of urea $CO(NH_2)_2$ may here be mentioned also: see UREA: ORGANIC COMPOUNDS.

ORGANIC COMPOUNDS: Originally restricted to compounds naturally occurring as products of a vital force acting in a more or less complex animal or vegetable organism. It was formerly believed that such compounds could be produced in no other way. At present organic chemistry includes the general consideration of compounds characterized by the presence of carbon and hydrogen, or by being based on such compounds. 'Organic compounds' has therefore a very wide meaning. Wöhler's discovery

(1828) of the formation of urea, the chief and most characteristic organic constituent of urine, from its inorganic isomer (see ISOMERISM), cyanate of ammonia, rendered this view untenable; and it is now known that very many substances which are products of animal or vegetable organisms, may be formed also artificially in the laboratory. Although such cases as that of urea, in which a complex organic product $CO(NH_2)_2$ is produced by the direct union of three inorganic substances (and many other cases of the same nature might be adduced), show that there is no definite line of demarkation between organic and inorganic products, it is convenient to classify chemical compounds according to their natural origin.

The following are leading characteristics of organic compounds: Those which occur naturally rarely consist of more than four elements—viz., carbon, hydrogen, nitrogen, and oxygen—though a few contain sulphur, and possibly (but this is doubtful) phosphorus. By artificial means, however, organic compounds can be formed containing chlorine, bromine, iodine, selenium, tellurium, and many of the metals. Carbon is universally present in both natural and artificial organic compounds. The number of equivalents entering into the composition of organic compounds is usually higher than in the case of inorganic compounds. No organic compound has been formed by the direct union of its elements in a free state.

Organic compounds may be composed of carbon and oxygen, as carbonic oxide, CO: or of carbon and hydrogen, as oil of turpentine, $C_{10}H_{16}$; or of carbon and nitrogen, as cyanogen, CN; or of carbon, hydrogen, and oxygen, as grape-sugar, $C_6H_{12}O_6$: or of carbon, nitrogen, and oxygen, as anhydrous cyanic oxide, C_2N_2O; or of carbon, hydrogen, and nitrogen, as nicotine, $C_{10}H_{14}N_2$; or of carbon, hydrogen, and sulphur, as oil of garlic $(C_3H_5)_2S$; or of carbon, hydrogen, nitrogen, and oxygen, as caffeine, $C_8H_{10}N_4O_2$; or of carbon, hydrogen, nitrogen, and sulphur, as oil of mustard, C_4H_5NS; or finally, of carbon, hydrogen, nitrogen, oxygen, and sulphur, as taurine $C_2H_7NO_3S$.

ORGANIC MEMORY: this phrase was introduced into the literature of physiology and psychology by Professor Hering. He used it to describe the greater ease and facility with which organic members move after they have practiced a given motion. It has been broadly applied to the fact that the brain and nervous system retain as 'organic memories' the modifications imposed upon them by previous nervous stimulation.

ORGANIC RADICALS, or COMPOUND RADICALS (or Radicles, as some chemists write the word): term including a number of groups of elements, of which carbon is always one, which comport themselves chemically like simple elementary bodies. The careful study of organic compounds led chemists to perceive that many of these contained as a proximate constituent a somewhat complex atomic group, which in its combining relations behaves

precisely like the elementary substances, and which, like them, may be transferred from one compound to another; hence the inference was drawn, that all organic compounds were combinations of organic radicals with oxygen, sulphur, hydrogen, or other elements, or of one organic radical with another. In accordance with this view, Liebig defined organic chemistry as *The Chemistry of Organic Radicals*. To show how much the theory of organic radicals serves to elucidate the composition of organic compounds, and to reduce the laws of organic to those of inorganic chemistry, we will point out some of the chemical analogies between the radical *ethyl* (C_2H_5) and the metal potassium (K), and between the radical *cyanogen* (CN) and the halogen chlorine (Cl). Cy is the symbol for cyanogen.

K_2O	= Potassium oxide.	$(C_2H_9)_2O$	= Ethyl oxide or ether.
KOH	= Potassium hydrate.	$C_2H_5.H.O$	= Ethyl hydrate or alcohol.
K_2SO_4	= Potassium sulphate	$(C_2H_5)_2SO_4$	= Ethyl sulphate.
KCl	= Potassium chloride.	C_2H_5Cl	= Ethyl chloride.
KS_2	= Potassium sulphide	$(C_2H_5)_2S$	= Ethyl sulphide.
	etc. etc.		etc. etc.

HCl	= Hydrochloric acid.	HCy	= Hydrocyanic acid.
KCl	= Potassium chloride.	KCy	= Potassium cyanide.
NH_4Cl	= Ammonium chloride.	NH_4Cy	= Ammonium cyanide.
HgCl	= Mercurous chloride.	HgCy	= Mercurous cyanide.
	etc. etc.		etc. etc.

Again if under certain conditions ethyl chloride is brought into contact with potassium hydrate, the reaction expressed in the following equation occurs:

Ethyl Chloride. Potassium Hydrate. Alcohol. Potassium Chloride.

$$C_2H_5Cl + KOH = C_2H_5OH + KCl$$

which shows that the ethyl and the potassium may mutually replace one another in compounds; and the same might be similarly shown of cyanogen and chlorine.

Comparatively few organic radicals have been obtained in isolated state; and in most cases the existence of any special radical is only inferred from the fact, that the group of atoms of which it is supposed to be composed can be transferred from one elementary substance to another, and can be made to enter into combination with other organic radicals. The existence of ethyl was thus inferred long before the substance itself was isolated, and the radical benzoyl, $C_7H_5O_2$, which exists in the oil of bitter almonds, and on which Liebig specially bases his whole theory of organic radicals, has never been isolated.

The organic radicals are either binary or ternary in their composition. Many of them—e.g., ethyl—consist of carbon and hydrogen; others, as carbonyl (or carbonic oxide), of carbon and oxygen; others, as cyanogen, of carbon and nitrogen; and others, like benzoyl, of carbon, hydrogen, and oxygen. Into a few radicals a metallic element enters; these are termed organo-metallic radicals; and cacodyl, which contains arsenic, and is represented by the formula $As(C_2H_3)_2$ is the best example of this class: see ORGANO-METALLIC BODIES.

ORGANIC SENSATIONS: those conscious experiences which result when the sensory surfaces in the internal organs, such as the viscera, are aroused through pressure, change in chemical conditions or other cause. These sensations are to be contrasted with other sensations as relatively vague and undifferentiated. They often escape attention when they are of moderate intensity. In their more intense forms such as hunger, and pain, they are so closely related to emotional states that they have often been designated as feelings. Thus one describes the experiences of digestive pain as a disagreeable feeling. Organic sensations furnish the best analogue in developed conscious experience for the vague undifferentiated experiences which probably characterize the mental lives of the lowest animal forms.

ORGANISTA, *awr-gan-ĭs'ta:* common name of a number of small S. American birds, allied to wrens, and remarkable for sweetness of song. The Peruvian O. (*Troglodytes leucophrys* of Tschudi) has a modest, cinnamon-brown plumage, with head and neck of dark olive. 'The tender melancholy strains, and the singular clearness of the innumerable modulations, charm the ear of the traveler, who, as if arrested by an invisible power, stops to listen.'

ORGANOGENY, n. *ŏr'găn-ŏj'ĕ-nĭ* [Gr. *orgănon*, an instrument; *gennăō*, I produce]: the development of organs from their primitive condition. OR'GANOGEN'IC, a. *-ō-jĕn'ĭk*, pertaining to the development of organs in plants and animals.

ORGANOGRAPHY, n. *ŏr'găn-ŏg'ră-fĭ* [Gr. *orgānon*, an instrument; *graphō*, I write]: a scientific description of the internal structure of plants. OR'GANOGRAPH'IC, a. *-ō-grăf'ĭk*, or OR'GANOGRAPH'ICAL, a. *-grăf'ĭ-kăl*, pertaining to. OR'GANOG'RAPHIST, n. *-ŏg'ră-fĭst*, one who is skilled in describing the internal structure of plants.

ORGANOLOGY, n. *ŏr'găn-ŏl'ŏ-jĭ* [Gr. *orgănon*, an instrument; *logos*, discourse]: that branch of physiology which treats of organs of animals. OR'GANOLOG'ICAL, a. *-lŏj'ĭk-ăl.*

OR'GANO-LYR'ICON: musical instrument invented by M. de Saint Pern in Paris 1870; consisting of a pianoforte, combined with 12 kinds of wind instruments—bassoon, horns, etc.; with two rows of finger-keys and pedals, and the bellows operated by clock-work and weights.

OR'GANO-METAL'LIC BODIES: in chemistry, compounds consisting of an organic radical in combination with a metallic base. The alkyl radicals—methyl, CH_3; ethyl, C_2H_5; propyl, C_3H_7; etc.—are the most familiar examples of organic bases which enter into combinations of this character: and zinc, lead, tin, and mercury are the most important metallic elements which combine with them. Zinc-ethyl, $Zn(C_2H_5)_2$, may be prepared by

the action of metallic zinc upon ethyl iodide, $C_2H_5.I$. A non-volatile, crystalline compound having the formula C_2H_5ZnI is formed at first, but under the influence of heat this decomposes into iodide of zinc and zinc-ethyl. As thus prepared, zinc-ethyl is a colorless liquid, which boils at 244° F. When exposed to the air it takes fire spontaneously, burning with a greenish flame. It may be converted, by slow oxidization, into ethylate of zinc, $Zn(OC_2H_5)_2$. Three compounds of ethyl and tin are known, and two compounds of ethyl and lead. Boron and silicon form compounds with ethyl, and these, although they contain no metal, are also called 'organo-metallic' bodies. Silicon-ethyl has the formula $(C_2H_5)_4Si$, and may be prepared by treating zinc-ethyl with silicon tetrachloride. It is a colorless liquid, boiling at 302° F. Several of its derivatives have a considerable theoretic interest, among these being a substance which has the formula $SiC_8H_{20}O$, smells like camphor, and behaves, chemically, like an alcohol. Sodium-ethyl has not been isolated in the pure state, but a double compound of this substance and of zinc ethyl has been prepared, having the formula $NaC_2H_5+Zn(C_2H_5)_2$.

ORGANON, n. *ŏr'gă-nŏn* [Gr. *orgănon*, an instrument]: a body of rules and canons for regulating scientific investigations; specifically a term applied to the collected logical treatises of Aristotle.

ORGANOTHERAPY: treatment of disease by means of preparations made from certain organs and tissues of sheep and other animals. The best example of this form of therapeutics is the treatment of myxedema and cretinism by means of the raw thyroid gland of the sheep or of an extract or powder made therefrom. In this disease (see MYXEDEMA) there is atrophy or diseases of the thyroid gland with loss of the internal secretion from the same, which contains a principle essential to normal metabolism (q.v.); by the administration of a preparation of the thyroid gland from one of the lower animals this principle is supplied to the economy, and the symptoms resulting from the lack of it disappear. The suprarenal capsule is another organ, preparations from which are found of great service in therapeutics; they are employed in Addison's disease (an affection of the suprarenal capsules) and as a constrictor of the small arteries, thereby arresting hemorrhage. Testicular extract has been employed for the relief of senile debility and in the treatment of certain spinal-cord diseases. Ovarian extract has also been given for senile debility in old women. Extracts of various other organs and tissues—thymus gland, pituitary body, pancreas, kidneys, liver, brain tissue, heart, etc.—have been prepared and tried in various diseases, but without any very pronounced results in most cases.

ORGAN-POINT, or PEDAL-POINT: a musical term derived from the mediæval *organicus punctus*, and applied to the single tone, usually the tonic or dominant, held

or maintained by one of the voice parts, while the other parts move freely, without reference to the sustained tone, except at the beginning and the end of the passage. In modern composition the organ-point is usually in the bass, hence the alternative term pedal-point, the organ pedal being best adapted to sustain the long note. When an organ-point occurs in any other part than the bass, it is said to be inverted, and if in the soprano is called the 'holding-note,' this term being also of mediæval conception and the origin of tenor from *tenere*, to hold, the voice by which the *organicus punctus* was generally sustained to an effective contrapuntal climax. In many modern compositions, especially pastorales, a double-organ or pedal-point on both tonic and dominant is frequently used.

OR'GAN—OR'GANISM—ORGAN'IC: words referring, under various aspects, to the reciprocal relation between a living body as a unity, and its component parts by each of which some distinct action, operation, or function is carried on. The word *organ* (from Gr. *organon*, instrument), is often employed in almost its original sense. But it has received a signification peculiarly its own with which alone the word *organism* is connected, as the designation of any of the functional parts or members of a living body—the *organism* being the living whole, animal or vegetable, which these organs compose. The idea of an organism or of organization is almost as much involved in obscurity and difficulty as that of *life*, with which it is so closely connected. But it is observable that a living body is entirely composed of organs, and these themselves of other organs, until we come to elementary cells; also, that all the parts are mutually dependent on each other; and therefore an organism has been defined as a natural whole, in which all the parts are reciprocally to each other means and end. The juice which nourishes a plant is elaborated by the plant itself, though the supplies are drawn from without. The leaves of a plant are produced by the stem, but re-act upon the stem in promoting its growth. This mutual dependence of parts strongly distinguishes an organism from a *machine*, in which the parts concur for a common end, to which each contributes in its own way, but in which each does not contribute to the support of all or any of the rest. In organisms, moreover, besides this support and maintenance of the different parts or organs, there is provision for the production of new organisms of the same kind, the reproduction or propagation of the species, to which there is nothing analogous outside the sphere of organic life. Among organic beings, as we ascend in the scale from the lowest kinds of plants and animals to the highest, we observe an increasing number of organs and of functions of organs. In the animal kingdom, organic life appears as possessed of sensation and spontaneous motion; while plants are limited to growth, assimilation, and propagation. The ques-

tion as to the nature of organic processes connects itself with a most difficult question as to the relation of chemical processes with psychical functions, chemical processes being certainly carried on, but singularly modified or directed by the living powers of the organic being.—The term organic is frequently applied to those things in which an analogy is traced to living creatures, in the mutual dependence of parts. Such an analogy may be traced in social life and in political and ecclesiastical life; and the more perfectly this relation of mutual dependence or mutual usefulness is established, the better is the state of things, social or political, or ecclesiastical. *Organic Laws* are those fundamental or most essential to the system to which they belong.

ORGANZINE, n. *ŏr'găn-zĭn* [It. *organzino:* F. *organsin*]: thrown silk of a very fine texture. The silk, after having been wound off from the cocoons into hanks, is then placed on a winding machine, which reels off the hanks on to wooden reels. These are then placed on spindles, and the fibres of each are made to pass through a minute orifice and small brush, which together clean the thread and remove any knots or projections from it, throwing it at the same time into hanks again. Then the threads of two hanks are taken, and again reeled off, this time on to one hank, being twisted together *to the left;* then two of these doubled reels are taken, and the ends being laid together, are twisted *to the right.*

ORGASM, n. *ŏr'gāzm* [Gr. *orgasmos*, softening, moistening]: immoderate excitement or action, especially in relation to the sexual act.

ORGEAT, n. *ŏr'zhăt* [F. *orgeat*—from *orge*, barley]: a syrup, agreeable to mix in certain drinks, and useful medicinally as a mild demulcent. It is prepared, in the simplest and best of many ways by making an emulsion of almonds, blanched for the purpose, and beaten into a paste in a mortar, and then rubbed up with barley-water.

ORGEIS, n. *ŏr'jē-ĭs:* the organ-ling, supposed to be so called from the *Orkneys*, on the coast of which it is caught.

ORGIES, n. plu. *ŏr'jĭz*, or MYSTERIES [F. *orgies*, revels—from Gr. and L. *orgĭă*, the rites of Bacchus: Gr. *orgion*, a sacred act; *ergon*, work]: secret rites or customs connected with the worship of some of the pagan deities; as the secret worship of Ceres (q.v.), and the festival of Bacchus, accompanied with mystical customs and wild abandonment to revelry. The name is now applied to drunken revelry and debauchery, particularly by night. ORGIASTIC, a. *ŏr'jĭ-ăs'tĭk*, pertaining to Bacchus or his rites.

ORGILLOUS, a. *ŏr'gĭl-ŭs* [F. *orgueilleux*, proud—from *orgueil*, pride—from It. *orgoglio*]: in OE., proud; haughty.

ORGUES, n. plu. *ŏrgz* [F. *orgue;* Gr. *orgănon,* an instrument]: in *mil.*, thick, long, wooden beams, pointed and shod with iron, hung vertically by separate ropes in the gateway of, and over the entrance to a fortified place: they answer the purpose of a portcullis or door, and are dropped into position by cutting the ropes from which they hang. Their descent is inevitable, in which they possess an advantage over the portcullis, which may be held up by the enemy or blown in by petards, whereas petards have little effect on orgues, for if one beam be destroyed, another can be dropped to fill up the gap. The name has been given also to a sort of infernal machine made of loaded gun-barrels to be discharged in defending a breach.

ORICHALC, or ORICHALCH, n. *ŏr'ĭ-kălk,* or OR'ICHAL'CUM, n. *-kăl'kŭm* [L. *orichal'cum;* Gr. *oreichal'kos,* mountain-copper—from Gr. *oros,* a mountain; *chalkos,* brass]: the brass of the ancients; a substance resembling gold in color, but of much less value.

ORIEL, n. *ō'rĭ-ĕl* [OF. *oriol,* a side gallery, a small chamber—from mid L. *orĭŏlum,* a little entrance, a corridor]: *anciently,* a small room next the hall in certain houses and monasteries where particular persons dined. ORIEL, or ORIEL WINDOW, is now a projecting window, generally of a trigonal or pentagonal form; called also Bay-window, Bow-window (q.v.); a large bay or recessed window in a church or in an apartment. It is one of the most picturesque features in mediæval and Elizabethan domestic architecture, and adds to the convenience of the interior. *Note.*—ORIEL, from mid. L. *oriolum,* a small room, a recess, usually thought to have been derived as diminutive from *os, oris,* mouth or opening, is derived by Skeat from L. *aureolum,* gilded or ornamented with gold—from *aurum,* gold, hence a special apartment thus ornamented, a portico, a recess. He also connects ORIEL with ORIOLE.

O'RIEL COLLEGE: in Oxford Univ., England. In 1324, Adam de Brom, almoner of Edward II., procured from the sovereign a charter of incorporation for a college, under the name St. Mary's House, in Oxford. The origin of its name 'Oriel College' is uncertain. It consisted originally of a provost and 10 fellows. The number of fellows was by subsequent benefactions raised to 18, and several exhibitions and scholarships were founded at various times. By the commissioners under 17 and 18 Vict. c. 81, all the fellowships are thrown open, but two are in the mean time suspended for the purpose of increasing the number and value of the scholarships, and of augmenting the salary of the prof. of modern history. By the same authority the scholars are placed on the foundation of the college, a position which previously they had not; the scholarships are made ten in number, tenable for five years, of value £80 per annum, with rooms free. This college was one of the first to throw open such of its fellowships as it could to competition, and hence the fellows of Oriel have long been among the most distinguished men in the university. For several years, however, its undergraduates have done little

in the schools. The fellows divide more than £200 a year, in addition to allowances; and the income of the provostship, to which is annexed a living in Essex and a canonry in Rochester Cathedral, is estimated at £2,000 a year. There are 13 benefices in the gift of this college.

ORIENT, a. *ō'rĭ-ĕnt* [F. *orient*, the East—from L. *oriens* or *orien'tem*, the rising sun—from *orīrī*, to rise, to become visible; It. *oriente*]: eastern; bright; shining: N. the East; the part where the sun rises: V. in *surv.*, to mark on a plan the bearings of the compass. O'RIENTING, imp. O'RIENTED, pp. ORIENTAL, a. *ō rĭ-ĕn'tăl* [F.—L.]: eastern; proceeding from Asia or the East—applied to gems, 'valuable; precious'—as opposed to *occidental*, applied to the less valuable: N. a native of Asia or the East. O RIEN'TALLY, ad. *-lĭ*. ORIENCY, n. *ō'rĭ-ĕn-sĭ*, brightness; richness of color. O'RIEN'TALISM, n. *-tăl-ĭzm*, the doctrines or idioms of the Asiatic nations. O'RIEN TALIST, n. *-ĭst*, one versed in the languages and literature of Asia; an inhabitant of the eastern parts of the world. O'RIENTA'TION, n. *-tā'shŭn*, the process of determining the east point in taking bearings. In modern ecclesiology, the term has (besides a special application as below) a general application to placing toward the east, as the altar of a church. As Christians from an early period turned their faces eastward when praying, so Christian churches were usually placed east and west, in order that the worshippers, as they looked toward the altar, might look also toward the east. Modern observation, however, has found that few ancient British churches stand exactly e. and w., the great majority inclining a little either to the n. or to the s. This deviation from the true east has received, among English ecclesiologists, the name of 'Orientation.' Its origin or cause has not been satisfactorily explained. Some have supposed that the church was turned not to the true east, but to the point at which the sun rose on the morning of the feast of the patron saint. But, unfortunately for this theory, neighboring churches, dedicated in honor of the same saint, have different orientations. Thus, All Saints' at West Beckham, in Norfolk, points due e.; while All Saints' at Thwaite, also in Norfolk, is 8° n. of east. There are instances, too, in which different parts of the same church have different orientations; the chancel and the nave built in not exactly the same line; e.g., York Minster and Lichfield Cathedral. Another theory is, that orientation 'mystically represents the bowing of our Savior's head in death, which Rom. Cath. tradition asserts to have been to the right (or north) side.' But this theory is gainsaid by the fact, that the O. is as often to the s. as to the n. Until some better explanation is offered, it may be held, that orientation (in this special sense of deviation) has had no graver origin than carelessness, ignorance, or indifference. See EAST.

O'RIENT, THE THREE KINGS OF: see MAGI.

ORIFICE, n. *ŏr'ĭ-fĭs* [F. *orifice*—from L. *orĭfĭcĭum*, an opening, an orifice—from *os*, a mouth, *oris*, of a mouth; *făcĭō*, I make: It. *orificio*]: a mouth or aperture, as of a pipe or tube; any opening.

ORIFLAMME, n. *ŏr′ĭ-flăm*, or AURIFLAMME, *aw′rĭ-flăm* [F. *oriflamme*—from mid. L. *auriflamma*, golden flame, golden banner, the standard of the monastery of St. Denis in France—from L. *aurum*, gold; *flamma*, a flame]: ancient royal standard of France, borne on a gilded lance, and consisting of a red flag deeply split at one end to form flame-shaped, pointed streamers. Originally this banner of the Abbey of St. Denis was borne by the Counts of Vexin, patrons of that church; but after the county of Vexin fell into the hands of the French crown, the O. became the principal banner of the kingdom. It was charged with a saltire wavy or, with rays issuing from the centre crossways. In later times the O. became the insignia of the French infantry. The name seems also to have been given to other flags; according to Sir N. H. Nicolas, the O. borne at Agincourt was an oblong red flag split into five parts.

ORIGAN, n. *ŏr′ĭ-găn*, and ORIGANUM, n. *ŏr·ĭg′ă-nŭm* [F. *origan*—from L. *orĭgănum;* Gr. *origanon*]: the wild marjoram; the mountain-joy, in reference to its habitat on open hilly ground; the *Origanum vulgārĕ*, ord. *Labĭātæ*.

ORIGEN, *ŏr′ĭ-jĕn*, or ORIGENES, *ō-rĭj′ē-nēz*, called *Adamantinos* or *Chalchentezos*—both epithets expressive of his firmness of purpose and unflinching assiduity: about 185—about 254; b. prob. at Alexandria: one of the most eminent of the early Christian writers, 'the father of biblical criticism and exegesis in Christendom.' His father, Leonidas, seems to have held some superior office in the church. O. received a most liberal education. While, on the one hand, he was initiated at an early age into Hellenic science and art, Christianity was instilled into his mind by men like Pantænus and Clemens of Alexandria. During the persecutions against the Christians, instituted by Septimus Severus, his father died the death of a martyr, and O., then 17 years of age, would have shared it of his own free will, had not his mother, left unsupported with six children, prevented him. After a short time his zeal and erudition procured for him the office of catechist in the Alexandrian church; but no salary being affixed to it, he was fain to dispose of his much-loved collection of classical authors for a daily stipend of four oboli (about four cents) for several years. His wants were extremely limited, and his asceticism led him even to self-mutilation (in accordance with his erratic interpretation of Christ's words in Matt. xix. 12): an act for which he afterward expressed deep sorrow, and which became a dangerous weapon in the hands of his antagonists. Not a few of his hearers being masters of Greek (Neo-Platonic) philosophy, O., to ward off more successfully their attacks on his doctrines, and to combat them on their own ground, applied himself particularly to this science, and Ammonius Saccas himself is said to have been his teacher. From this period also may be dated O.'s transition from unconscious to conscious belief. He examined henceforth, with as little prejudice as possible, all the different systems of human speculations that came under his notice during his many jour-

neys; proceeding on the principle 'that we are not, under the pretense of piety, to pin our faith on that which is held by the multitude, and which therefore alone seems to stand on high authority, but on that which results through examination and logical conclusions from established and admitted truths.' This liberality of his mind and doctrines could not fail, on the one hand, to bring about many conversions to the faith, as he taught it, among both 'pagans' and 'heretics,' the latter chiefly of the Gnostic sects; and on the other hand, to raise an outcry among less liberal teachers of the faith, who had not been so successful in their labors. What gave greatest offense in his teachings was his way of explaining, after the manner of the Midrash, known to him through the Jewish masters (from whom, at an advanced age, he had also learned Hebrew), allegorically and symbolically that which in the Scripture warred with the common human understanding, or seemed repugnant in manner or matter. Furthermore, while upholding all the ethical portions of the Bible, he rejected much of its supposed historical and legal contents for all purposes, except, perhaps, as starting-points for homiletics. 'What edification,' he says, 'could we find in literally interpreting the story of Abraham's first telling Abimelech a lie, and then, with Sarah's consent, handing her over to him and prostituting her?' As to the discrepancies in the different gospels respecting the life of Christ, he says: 'One of two only is possible. Either these things are true in a *spiritual* sense only, or as long as the discrepancies are not satisfactorily explained away, we cannot believe in the gospels being dictated by the Holy Spirit, and redacted under the influence of his inspiration.' In the view of modern scholarship—even of that unfriendly to Christianity—O.'s alarm was needless and his concession more than the case demanded: the discrepancies disprove not the substantial historical verity of the gospels, but only the mechanical theory of their exact verbal dictation by the Holy Spirit.

In 211 O. went to Rome, but soon afterward, at the wish of Bishop Demetrius, he returned to Alexandria, which, however, he was obliged to leave precipitately, and to seek refuge from certain popular tumults in Palestine. Here the bishops received him with great honors, and requested him to institute public lectures, in which they themselves became hearers. Recalled again by the Alexandrian bishop, he was sent to Achaia to combat certain heresies that had broken out there. The wrath that had silently been gathering against him found its first vent when, in 228, the bishops assembled in Cæsarea in Palestine consecrated him presbyter. The Bishop of Alexandria took umbrage at this outrage, as he called it, on his authority. Two councils were convoked, and in 232, O. was deprived of his priestly office, and excommunicated, the principal heresy charged against him being his denial of eternal punishment. Yet the churches of the East adhered faithfully to him. Palestine, Arabia, Phœnicia, and Achaia remained in constant communication with him; and men like Greg-

ory Thaumaturgus (q.v.), Athenodoros, and others, remained or became his faithful disciples, while the bishop of Cæsarea allowed him openly to expound the Scriptures in his church. The persecutions under Maximinus again forced him to seek refuge for two years in Cappadocia. Returning under Gordianus, he resumed his labors and journeys, until, when Decius ascended the throne, he was seized, imprisoned, and tortured for his faith. He did not survive his sufferings long, but died at Tyre, where his tomb, near the high altar of the cathedral, was shown for many centuries, until it was destroyed during the Crusades.

The number of his works is stated by Epiphanius and Rufinus to have exceeded 6,000; and though this is probably meant as only an exaggerated round number, yet the amount of writings that issued from his always busy brain and hands cannot but have been enormous. Seven secretaries and seven copyists, aided by an uncertain number of young girls, are by Eusebius reported to have been always at work for him. The great bulk of his works is lost; but among those that have survived, the most important by far are his two editions of the Old Testament, called respectively *Tetrapla* (*four*fold) and *Hexapla* (*six*fold): see HEXAPLA. The labor bestowed on this work must have been immense, and no less than 28 years is O. supposed to have been engaged in it. On its importance for biblical criticism it is needless to enlarge here. Fragments only have come down to us, the original having been lost during the siege and capture of Cæsarea by the Arabs; and the Greek as well as the Roman clergy having almost laid an interdict upon the copying of any of O.'s much-suspected writings. Montfaucon has collected and edited these fragments (*Hexaplorum Origenis quæ supersunt*, 2 vols. folio, Paris 1714), which were re-edited by C. F. Bahrdt (1769–70). Of O.'s other partly extant, partly lost works, the chief are his books 'On the Resurrection,' 'On Martyrdom,' 'Eight Books against Celsus,' 'On Prayer,' besides Epistles, etc. He further revised and enlarged Philo's Lexicon of Hebrew Names (*Hebraicorum Nominum S. Scripturæ et Mensurarum Interpretatio*), whence it has often, together with many other spurious works, been ascribed to him exclusively. Little also has survived of his many exegetical writings, commentaries, brief notes, and homilies on both Testaments. The best editions of his collected works are by De la Rue (Paris 1733; 2d ed 1856); by Oberthür (1785, 15 vols.); and by Lommatzsch (Berlin 1831–48). See works on O. by Thomasius (1837) and Redepenning (1846); also Herzog.

ORIGIN, n. *ŏr′ĭ-jĭn* [F. *origine*—from L. *origĭnem*, origin, descent—from *orīrī*, to rise, to become visible: comp. Gael. *ur*, light, fire]: first existence or beginning; derivation: cause; root; source. ORIGINAL, a. *ō-rĭj′ĭ-năl*, first in order; preceding all others: primitive; having the power to originate new thoughts or ideas; not copied: N. that which precedes all others of its kind; fountain: source; that from which anything is translated, transcribed, or copied. In *analytic geometry*, the point from which the coördinates are measured. ORIG′INALLY, ad. *-lĭ*, primarily; at first. ORIG′INAL′ITY, n. *-năl′ĭ-tĭ*, the power or faculty of producing new thoughts, or rare combinations of thought. ORIGINATE, v. *ō-rĭj′ĭ-nāt*, to bring into existence; to take existence: to cause to be: to begin: to produce what is new. ORIG′INATING, imp. ORIG′INATED, p. . ORIG′INATOR, n. *-nā-tẽr*, one who originates. ORIG′INA′TION, n. *nā′shŭn*, the act of bringing or coming into existence; first production: mode of production or bringing into being.—SYN. of 'origin': beginning: foundation: fountain: commencement; rise; spring; birth; occasion;—of 'original, a.': primary; pristine; first.

ORIG′INAL SIN, DOCTRINE OF: theological tenet, which, in its extreme form, presents man as coming into the world with the reason and will utterly corrupt; this corruption originated in the fall of Adam, and has been inherited equally by all his posterity, so that the natural man is not only incapable of knowing and loving God and goodness, but is altogether inclined to contemn God and pursue evil; on which account, the anger of God has subjected man to temporal death, and destined him to everlasting punishment in hell; from which penalty there is salvation for only the fixed number of the elect—to whom God, according to His eternal decree, grants a new nature—or, in a different phase of doctrine, for those new-born by baptism. From this extreme, the doctrine has been variously modified and softened. The tenet is founded on the account of the fall given in Genesis, and on some passages in the apostle Paul's Epistle to the Galatians and in that to the Romans; which passages, however, are held by others to contain no such doctrine; and, indeed, nearly every point in the history of this tenet is the subject of as much controversy as the details of the doctrine itself. The early church, it is maintained by one school, was unacquainted with it; and even the most orthodox admit that the doctrine had not at that time been fully developed. The Christian Fathers, Justin Martyr, Clemens Alexandrinus, Irenæus, and others, ascribe to the natural man a certain ability to know God and choose the good: it is asserted that they reject distinctly all propagation of sin and guilt, and even refer human mortality not to Adam's sin, but solely to the constitution of the body. Origen, on the other hand, in opposition to the Gnostics and Manichees, who grounded the sinfulness of men on the connection of the soul with a material body, asserted that

the sinfulness was in existence at birth, but ascribed the development of actual sins and their consequences not to propagation, but to the moral operation of precept and example. He accordingly found the cause of sin to be in the freedom of the will, the abuse of which he explained partly by the operation of evil powers, partly by the predominance of the sensuous part of man's nature over the rational mind. The orthodox teachers of the Greek Church held that Adam, by the fall, rendered himself and all his posterity mortal; but, according to the less rigid schools, they sought the origin of sin in the freedom of the will acted upon by the flesh and by demoniacal influences, and ascribed to man the power of resisting every evil, if he chose. These views, it is alleged, continued to be held, in substance, by the Christian teachers in the east, and were fully developed by Chrysostom; but Rom. Cath. writers maintain that in all this Chrysostom and the other Greek Fathers are speaking not of the *natural* powers of the will, but of the will as assisted by Divine grace.

The doctrine took another shape in the Latin Church. Tertullian, following up his dogma of Traducianism, according to which the child derives not only its body, but also its soul, from its parents, maintained that sinfulness had been propagated, together with mortality, from Adam to all mankind; he thus defended an *originis vitium*, without conceiving it as actual sin and without denying all capability for good in man. This view was followed by Cyprian, Ambrose, and even by Augustine in his earlier writings. It was only during his controversy with Pelagius and Cælestius that Augustine came to develop the doctrine of original sin into the full form first stated above. His great influence in the western churches procured the condemnation of his opponents, the Pelagians (q.v.), as heretics, at the Councils of Carthage (412, 416, 418), though the Councils of Jerusalem and Diospolis (415) decided in their favor. Building upon the foundation of Traducianism, Augustine laid down that every natural man is in the power of the devil, and upheld the justice of this as a punishment for the share which the individual had in Adam's transgression; for as all men existed in the loins of Adam, all sinned with him. Pelagius, on the other hand, who rejected the Traducian theory, denied that sin is propagated physically, or that the fall of Adam has exercised any prejudicial influence on the moral constitution of his posterity; and maintained that all men are born in a state of innocence, possess the power of free-will, and may therefore live without sin. He and his followers objected, to Augustine, that his doctrine was in direct contradiction to clear passages of Scripture, and that it made God the originator of evil and an unrighteous judge.

Great as was the respect for Augustine, the harshness of his doctrine was too shocking to the natural sentiments to find lasting acceptance. In the Eastern Church it never gained footing, and even in the west it met

opposition. In Gaul, John Cassian, Faustus, Arnobius, and others, held a view midway between the views of Augustine and Pelagius; wherefore they were called Semi-Pelagians. They attributed to man a capacity for good which makes it possible for him not indeed to merit the favor of God, but to make himself capable of receiving it; and maintained that it is only a certain inborn weakness that men inherit from the first pair. The Semi-Pelagian doctrine found acceptance especially among the monks (in particular among the Franciscans), and continued to prevail during the middle ages, finding, among the scholastics, partizans in the Scotists. Augustine's views also found advocates among the scholastic philosophers, who, however, added many limitations and explanations. Regarding the way in which original sin is propagated, many held by the Traducian theory; while others conceived it to be a sort of infection of the soul by the defiled body, or an imputation of guilt to all partakers of the human nature. Petrus Lombardus adhered to Augustine. Anselm of Canterbury conceived original sin to be a want of requisite righteousness, and thought that this want was imputed to all the posterity of Adam, though not in the same degree as if they themselves had sinned. Anselm's view was adopted by Duns Scotus; while Bonaventura and Thomas Aquinas sought to combine the opinions of Anselm and Augustine. Anselm had thought that his theory afforded a better explanation of the sinless birth of the Lord Jesus; and about the 12th c. it began to be maintained that the Virgin Mary also was conceived without sin.

The reformers of the 16th c. everywhere made original sin a leading doctrine, and thus were enabled to combat effectively the Rom. Cath. doctrine of the merit of works: while the Rom. Cath. Church, in the fifth session of the Council of Trent, stamped what the Calvinist school would call Semi-Pelagianism as the orthodox doctrine. The Reformed churches agreed with the Lutheran on the point of original sin. In this they followed Calvin rather than Zwingli, who considered it as an evil or disease, and as becoming sin only when a commandment is transgressed. The Arminians and Socinians, on the other hand, denied the doctrine of hereditary sin in the ecclesiastical sense. The Mennonites spoke of a loss of the Divine image in consequence of the fall of Adam, but still asserted the free-will of man. The Quakers rejected the name of original sin altogether; they held that there is a germ of sin in man, from which imputable sin springs, and that, however corrupt, he has still the susceptibility of being awakened to the inward light. The whole Prot. Church held, besides, that the Lord Jesus alone was free from sin, both original and actual. The Rom. Cath. Church ascribed this attribute also to the Virgin Mary, though no public and distinct declaration on the point was given by the Council of Trent: see IMMACULATE CONCEPTION.

The harshness of the Augustinian dogma led, at the

time of the Reformation, to keen controversies: Erasmus disputed the point with Luther, and would admit only a weakness of the free-will arising from original sin, and by no means a complete annihilation of free-will. From that time the doctrine in Germany continued to be variously attacked and defended. It has been discussed by the schools of philosophy. Kant showed the moral signification of the dogma, and made out original sin to be a propensity to evil inherent in man. The Schelling-Hegel school explained it as the finite nature with which the individual is born. In recent times, the theologians of the old Lutheran and strictly orthodox tendencies, such as Olshausen, Tholuck, Hengstenberg, and others, have come forward as adherents and defenders of the Augustinian doctrine; while the more liberal theologians modify it in various ways, not admitting any moral inborn corruption arising from the fall, but only a weakness in man's nature for the knowledge and performance of good.

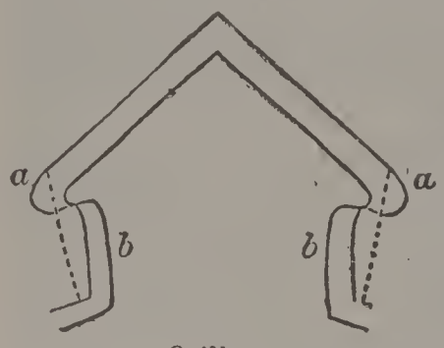
How far, and with what differences, the extreme Augustinian view is held by the churches of England and Scotland is shown respectively by the following extracts from the *Thirty-nine Articles* and the *Westminster Confession of Faith*. From Art. ix. of the *Thirty-nine Articles*: 'Original sin standeth not in the following of Adam (as the Pelagians do vainly talk); but it is the fault and corruption of the nature of every man, that naturally is engendered of the offspring of Adam, *whereby man is very far gone from original righteousness*, and is of his own nature inclined to evil, so that the flesh lusteth always contrary to the spirit; and therefore, in every person born into the world, it deserveth God's wrath and damnation.'

From chap. vi. of the *Westminster Confession*: 'By this sin' (i.e., the eating of the forbidden fruit), 'they' (i.e., our first parents) 'fell from their original righteousness and communion with God, and so *became dead in sin, and wholly defiled in all the faculties and parts of soul and body*. They being the root of all mankind, the guilt of this sin was imputed, and the same death in sin and corrupted nature conveyed to all their posterity, descending from them by ordinary generation. From this original corruption, *whereby we are utterly indisposed, disabled, and made opposite to all good, and wholly inclined to all evil*, do proceed all actual transgressions.'

In much of the recent development of evangelical thought, the term original sin is not favored. The fact which it was intended to set forth is not denied; indeed, such denial is not possible in view of the realities of human history and human life; but the fact is held as scarcely amenable to a strictly philosophic statement which shall be accurate and exhaustive. The tendency is to leave it as part of the solemn background of mystery which is sure to assert itself under any clear scriptural presentation of God's sanctifying and saving grace in Christ.

ORIHUELA, *ō-rē-wā′lâ:* ancient town of Spain, in the modern province of Alicante, 36 m. s.w. of the city of Alicante; on the banks of the Segura, in a plain remarkable for beauty and fertility. The town is long and straggling; and its palm-trees, square towers, and domes give it an oriental appearance. It contains a cathedral, numerous churches and convents, barracks, etc. The manufactures are linen goods and hats, and there are many corn and oil mills and tanneries. Olive-oil is very extensively made. The vegetation here is gigantic; the oleanders are trees. O. has been possessed by Carthaginians, Romans, Moors, and Spaniards in turn. Pop. 24,000.

ORILLON, n. *ŏ-rĭl′ŭn* [F. *orillon*, a sort of fortification —from *oreille*, an ear—from L. *auris*, an ear]: in *fortification*, especially in the earlier systems, a semicircular projection at the shoulder of a bastion, intended to cover from the observation of the enemy the guns and defenders on the flank, which, with such a construction, is somewhat retired or thrown back. The flank thus protected is held by many distinguished engineers to be most valuable in the defense of the ditch, in clearing it from an attacking party, or from hostile miners. The retired flank is sometimes straight; at others curved, as in the figure. The O. is as old as the bastion, and is found in the works of Pagan and Speckle.



Orillon:
a, a, orillons; *b, b*, retired flanks (the dotted lines show the original bastion).

ORINOCO, *ō-rĭ-nō′kō:* great river of S. America, flowing through Guiana and Venezuela, and reaching the Atlantic Ocean s. of Trinidad, lat. 8° 40′ n. The country in which it takes its rise is inhabited by an aboriginal race called the Guaicas, who have hitherto prevented access by foreigners to its sources; but it is known to rise in the Sierra Parime, one of the chief mountain chains of Guiana, near lat. 3° 40′ n., long. 64° 30′ w. It was explored by Humboldt to the village of Esmeraldas (lat. 3° 8′ n., long. 66° 5′ w.), and by Schomburgk to within 30 m. of its source. After flowing w.s.w. 20 m., past Esmeraldas, the river bifurcates, and the s. branch, the Cassiquiare (q.v.), flowing s.w., joins the Rio Negro, an affluent of the Amazon. From this point the O. flows n.w. to its junction with the Guaviare, then n.n e. to its junction with the Apure, after which it flows e. to its mouth. Length 1,960 m. The head of uninterrupted navigation is at the confluence of the O. with the Apure, 777 m. from the mouth of the river. Above this point, the course is interrupted by 'raudals' or cataracts, of which those of Maypures and Atures are the most celebrated. Its principal affluents from the left are the

Guaviare, the Vichada, the Meta, and the Apure; from the right, the Ventuare, Caura, and Caroni. The O., which is joined by 436 rivers and more than 2,000 smaller streams, drains an area (usually stated at 250,000 sq. m.) which, according to Wappäu's *Republiken von Süd-Amerika*, may be estimated at 650,000 sq. m. It begins to form its delta 130 m. from its mouth, by throwing off a branch which flows n. into the Atlantic. Several of the mouths are navigable, and the main stream, the Boca de Navios, is divided by a line of islands into two channels, each two m. in width. Bolivar, a town more than 250 m. from the mouth of the river, marks the head of tide-water, and here the river is 4 m. wide and 390 ft. deep. Below the junction of the Apure, the character of the scenery seems to be uniform—forests on the right bank, and llanos on the left.

ORIOLE, n. *ō′rĭ-ōl* [Sp. *oriol*—from L. *aurĕŏlus*, golden (see ORIEL): OF. *oriol*, a witwal], (*Oriolus*): genus of birds of the Thrush family (*Merulidæ* or *Turdidæ*), having an elongated conical beak, broad at the base; the upper mandible ridged above, and notched at the point; wings of moderate size, the first feather very short, the third the longest; the tail of moderate length, and rounded; the tarsus not longer than the middle toe; the outer toe joined at its base to the middle toe; claws strong and curved. The species are numerous, all natives of the old world, and chiefly of the warmer parts of it; the adult males generally of much brighter plumage than the females and young males, the prevalent color yellow. Only one species is found in Europe, the GOLDEN O. (*O. galbula*), common in Italy and some other parts of Europe, but a rare summer visitant of England. The name O. is still very frequently given to the Baltimore-Bird (q.v.) and other American birds of the Starling family, the chief resemblance of which to the true orioles is in color.

ORION, n. *ō-rī′ŏn* [L. and Gr. *Orion;* It. *Orione;* Fr. *Orion*]: in Greek mythology, a gigantic hunter, reputed the handsomest man in the world. His parentage is differently given. According to the commonly received myth, he was the only son of Hyrieus of Hyria, in Bœotia, and was called in his own country Kandaon. Another account makes him a son of Poseidon and Euryale, while some state that he was *Autochthonos*, or 'earth-born.' So immense was his size, that when he waded through the deepest seas he was still a head and shoulders above the water; and when he walked on dry land, his stature reached the clouds. Coming to Chios, in the Ægean Sea, he fell in love with Æro or Merope, daughter of Œnopion. He cleared the isle of wild beasts, and brought their skins as presents to his sweetheart; but her father always put off their marriage; whereupon O., one day giving way to passion (under the influence of wine), sought to take the maiden by force. Œnopion now called upon Dionysus (Bacchus) for help, who put out

the eyes of the inebriate lover. Orion, however, recovered his sight in Lemnos, by following the advice of an oracle, and returned to Chios to take venegeance on Œnopion. Not finding him, he went to Crete, where he spent the rest of his life hunting in company with Artemis (Diana). The cause and manner of his death are differently related. Artemis, say some, slew him with an arrow, because Eos, inflamed by his beauty, had carried him off to Ortygia, and thereby offended the gods. Others aver that Artemis, virgin-goddess though she was, cherished an affection for him, that made her brother Apollo fiercely indignant. One day, pointing out to her at sea a black object floating in the water, he told her that he did not believe she could hit it. Artemis, not recognizing her favorite, drew her bow, and pierced him through the head. A third myth makes him find his death from the sting of a scorpion. Asklepios (Æsculapius) wished to restore him to life, but was slain by a bolt of Zeus. After his death, Orion was placed with his hound among the stars, where, to this day, the most splendid constellation in the heavens bears his name: it is represented by the figure of a man with a sword or club by his side, and covered with a lion's skin.

ORISKANY, *ō-rĭs'kā-nĭ'* BATTLE OF: in American history, an engagement between the British and Indians and the American forces, near Oriskany, N. Y., 10 miles from Fort Stanwix, 1777, Aug. 6. The opposing forces each numbered about 800 men. The Americans, under General Herkimer, started to relieve Fort Stanwix, which was besieged by Saint Leger, Brant and his Indians. At Oriskany he halted and attempted to concert an attack and a sortie. The plan miscarried. Herkimer advanced and was attacked by the Indians and Tories in a deep ravine. The battle raged furiously for hours, despite a terrific thunderstorm, and was one of the most cruel and bloody of the Revolutionary War. Each side lost a third of its number. The Americans remained masters of the field, although badly disabled. The sortie from the fort was a success, and badly crippled the enemy. Gen. Herkimer was mortally wounded.

ORISKANY STAGE: in geology, the lowest group of the Devonian system, so called from Oriskany Falls, N. Y., northeast of Utica, and apparently the northern limit of the stage in New York, the name being due to the New York Geological Survey. In Maine it is several thousand feet thick, but is much thinner in western New Jersey, eastern Pennsylvania, Maryland, Virginia, and West Virginia. It also occurs in Ontario, and crops out in southern Illinois. Its rocks are calcareous sandstone or arenaceous limestone, containing a few fossils such as crinoids, cystoids, brachiopods, gastropods, and trilobites.

ORISON, n. *ŏr'ĭ-zŏn* [OF. *orison;* F. *oraison*, a speech, a prayer—from mid. L. *oratiōnem*, a prayer—from L. *oro*, I speak or plead]: a prayer or supplication.

ORISSA.

ORISSA, *ō-rĭs'sâ:* ancient kingdom of Hindustan, the authentic history of which goes back to A.D. 473. It extended from Bengal—a part of which it included—on the n. to the banks of the Godavari on the s., and from the coast on the e. to the river Gondwana on the w. From its remains of sculptures, inscriptions, etc., we may infer that its early civilization was high. The temple of the sun at Kanárek—erected about the 12th c.—exhibits carvings representing the planets, sculptured figures of animals, etc., which show that at that date the plastic and mechanical arts were in a more advanced state in O. than they were in England. It maintained its position as an independent monarchy till 1558, when, its royal line having become extinct, it became an outlying province of the empire of the Great Mogul. On the breaking up of this empire, the more valuable portions of O. were seized by the Nizam of Hyderabad. The French, who had taken possession of a part of the country long known as the Northern Circars, attempted to drive out of India the English, who also had formed commercial settlements on the coast. The result of the contest for supremacy in India, between the French and English, is well known. The Mahrattas, who had seized a portion of O. 1740, were forced to surrender it to the English 1803. The soldiers of the E. India Company were marched into O. at the commencement of the 19th c., and an engagement was subsequently entered into between the company and the native chiefs and princes, by which the former bound themselves to perform certain services for the country (as maintaining the river-banks in good repair), while the latter engaged to pay a yearly tribute. Of the many principalities into which O. was divided, a large number got into arrears with the govt., and the result was that numbers of the estates were sold, and the govt. frequently became the purchaser. Much of the territory originally forming a portion of this kingdom thus fell into the hands of the British. The ancient O., which existed as an independent monarchy for four centuries, and flourished as a principality of the Mogul empire after 1558, is now hardly to be recognized in the British commissionership of O., with area 23,901 sq. m. O. is traversed by a branch of the eastern Ghauts running parallel with the coast. The hill districts, which nowhere present an elevation of more than 3,000 ft., are inhabited by the Gonds, the Koles, the Sourahs, and the Khonds. The Khonds occupied an area extending from n. of the Mahanadi, s. to the banks of the Godavari. Their mountain haunts are admirably suited for defense, as the districts which they inhabit are almost inaccessible; and though they do not yet appear to have adopted firearms, they manage their battle-axes and bows and arrows with an adroitness and courage that make them formidable enemies. The Khonds are a totally distinct race from the inhabitants of the plains, and there is but little resemblance between them and the other hill tribes, the Gonds and Sourahs. The chief peculiarities of the Khonds

are, that their language, quite distinct from those of the neighboring tribes, is not in the least understood by the inhabitants of the plains; and that human sacrifice formed, till within the last few years, one of the distinguishing features of their religion. They do not barter or traffic, and all commercial transactions are managed for the Khonds by the Panus, Doms, etc., regarded by their employers as inferior races. There are, however, no caste prejudices among the Khonds, such as prevail throughout the plains of India. Agriculture and war are the only employments. The revolting custom of human sacrifice prevailed among the Khonds from the earliest times, although it was not till 1836 that the attention of the govt. was specially called to the subject, at the conclusion of an insurrection, in the course of which British officers had been brought into contact with the hill tribes. The Khond victims, called Meriah, were always bought with a price, sometimes from families of their own tribes who had fallen into poverty, but generally kidnapped from the plains by miscreants of the Panu race. The Meriah victims were of both sexes, and of every age; though adults were held in highest esteem, because, being the most costly, they were supposed to be more acceptable to the deity. The object of the sacrifice was to propitiate the earth-god; and abundant crops, security from calamity, and general prosperity were supposed to be insured to any one who had cut off a portion of the flesh of the human victim, and buried it in his farm. The consummation of the Meriah sacrifice was often with most revolting and disgusting cruelty. In some cases the event was preceded by a month's feasting, intoxication, and dancing round the Meriah. On the day before the sacrifice, the priest thus addressed the victim: 'We have bought you with a price, and did not seize you; now we sacrifice you according to custom, and no sin rests with us.' On the following day, the victim was made senseless from intoxication, and then suffocated; after which the officiating priest cut a portion of the flesh from the body, and buried it as an offering to the earth-god. The people, following his example, hewed the flesh from the bones, and carried the bloody trophy to their distant villages, where it was buried. In many cases the victim was not intoxicated before sacrifice; but the joints of his arms and legs were broken with a hatchet, in order to prevent the possibility of resistance. From 1837 the govt. put forth strenuous efforts to suppress this abhorrent practice, appointing as special agents for the purpose Maj. M'Pherson and Maj.Gen. Campbell; and 1852–3 all victims retained for sacrifice were demanded. The custom has entirely ceased. The practice of female infanticide also has now been almost suppressed. The irrigation of a large portion of O. is provided for by an extensive and costly system of canals, taken by the govt. 1868. Careful surveys of its coast were made 1870.—The country was decimated by famine 1868-9. Pop. (1872) 4,317,999; (1901) 4,343,150.

See *Report by Lieut. M'Pherson*, 1841; *An Account of the Religion of the Khonds in Orissa, idem* in the *Trans. of Asiat. Societies*, 1851; Campbell's *Personal Narrative of Service amongst the Wild Tribes of Khondistan*, 1864; *Calcutta Review*, Nos. IX., XI., XV., and XX.; Kaye's *History of the Administration of the E. I. Co.*, 1853; *Memoir: Administration of India during Last Thirty Years*, 1858; *Indian Records—History of the Rise and Progress of the Operations for the Suppression of Human Sacrifice and Female Infanticide in the Hill Tracts of Orissa* (1854); and *Orissa*, by W. W. Hunter, director-gen. of the statistical survey of India (1872).

ORISTANO, *ō-rĭs-tâ'nō:* town and inferior river-port on the w. coast of Sardinia, 56 m. n.w. of Cagliari. It stands in a fruitful, well-cultivated plain, about a mile from the left bank of the Tirso or Oristano, and 3 m. from its mouth in the Gulf of O., which is about 10 m. in length, with a breadth of 5 m. It is surrounded by ancient walls flanked with towers; contains a cathedral with a great clock-tower, the most conspicuous object in the town, an archbishop's palace, college, and several churches and convents. O. has manufactures and fisheries. In summer the town is unhealthful. Pop. 2,500.

ORIZABA, *ō-rē-sâ'ba*, Sp. *ō-rē-thâ'vâ:* town of Mexico, state of Vera Cruz, 70 m. w.s.w. of the town of Vera Cruz, 25 m. s. of the volcano of Orizaba. The vicinity is unusually fertile, and is covered with forests. The town contains numerous churches, a high school, and an extensive cotton-spinning factory. Coarse cloths and tobacco are largely manufactured, and there is much general industry. Pop. (1900) 31,500.

ORIZABA, *ō-rē-sâ'ba*, Sp. *ō-rē-thâ'vâ*, AND POPOCATEPETL, *pō-pō-kât-ā-pā'tl:* two highest mts. of Mexico. Hitherto Popocatepetl has been deemed the higher peak, and the highest mountain of N. America, except Mt. St. Elias, Alaska; but certain precise barometric determinations in the spring of 1890, by Prof. Heilprin of the Philadelphia Acad. of Nat. Sciences, necessitate revision of the recorded heights of these mountain masses.

The height of Orizaba as determined by Humboldt, by means of angles taken from the town of Jalapa, was 17,375 ft. An earlier determination, by Ferrer, made it 17,879, but Humboldt's has been generally accepted. Prof. Heilprin's measurement, made about 120 ft. below the apex of the cone (for the ascent had been exceedingly difficult, and he was unable to reach the highest point), indicates a total height of 18,206 ft. The ascent of Orizaba was made Apr. 6–7; that of Popocatepetl 10 days afterward. Prof. Heilprin's party reached the highest point of the latter mountain Apr. 17, and found the height 17,523 ft.—about 200 ft. less than Humboldt's measurement, and 683 ft. less than his own measurement of Orizaba. Two other great Mexican summits also were ascended—Ixtaccihuatl, found to be 16,962 ft. in height, and Monte Nevado de Toluca, 14,952 ft.

ORKNEY ISLANDS, *awrk'nē:* Scotland, an archipelago forming a single county, separated from the northern coast of Caithness, by the Pentland Firth, from six to eight miles broad. There are in all about thirteen islands of considerable size, with a number of smaller dispersed over the archipelago. They extend from lat. 58° 42′ to 59° 23′ N.; lon. 2° 22′ and 3° 25′ W.; aggregate area, 390 square miles, or 249,565 acres, of which about 107,000 are under culture. Among the larger islands are Pomona or Mainland, Hoy, South and North Ronaldsay, Westray, Sanday, Eday, Stronsay, Ronsay, and Shapinsay. Of the whole about 28 are usually inhabited, although five or six do not contain a dozen inhabitants each. Hoy is the only island of the group that can be called mountainous, and here the highest elevation is but 1,600 feet. With the exception of a granitic district near Stromness, the islands are of old red sandstone formation. There is abundance of clay and peat-moss; in many places marl, and in some bog-iron ore. There are no streams deserving the name of rivers, but springs of good water are abundant; and there are many lakes, the largest of which Stennis, in Mainland, is 14 miles in circumference. Chalybeate springs are not uncommon. The climate is moist, but not cold, being tempered by the Gulf Stream that sweeps around the shores. In winter storms of sleet and rain are frequent, but in summer the weather is generally fine and steady. Oats, turnips, and hay are the chief crops, and 16,000 acres of land are devoted to permanent pasture. The common breeds of sheep, cattle, and horses were small, but since the introduction of good stock from the south, have become large and valuable. Rabbits and poultry are numerous. The herring and cod fisheries compensate in some parts the absence or defective development of other resources, and large numbers of lobsters are annually sent to London. The principal manufactures are hosiery, made by the females, and the building of boats, making of sails, nets, and cordage. The chief town is Kirkwall, which has regular steam communication with Aberdeen and Leith.

The Orkneys, under the name *Orcades* [whence the modern adjective Orcadian], are mentioned by the ancient geographers, Pliny, Ptolemy, Mela, and by other classical writers; but of their inhabitants we know almost nothing till the dawn of the middle ages. They were probably of the same stock as the British Celts. From an early period, however, the Norsemen resorted to these islands, as a convenient spot from which to make a descent on the Scotch and English coasts. In 876, Harald Haarfager conquered both them and the Hebrides. During the greater part of the 10th c. they were ruled by independent Scandivanian jarls (earls), but in 1098 they became formally subject to the Norwegian crown. Thus they remained till 1468, when they were given to James III. of Scotland as a security for the dowry of his wife, Margaret of Denmark. The islands

were never redeemed from this pledge; and in 1590, on the marriage of James I. with the Danish Princess Anne, Denmark formally resigned all pretensions to the sovereignty of the Orkneys. During their long connection, however, with Norway and Denmark, all traces of the primitive population disappeared. The present proprietors of lands are chiefly of Scotch descent; and the inhabitants generally are a mixed race of Scandinavian and Scotch descent. The inhabitants are to a considerable extent of Scandinavian blood. Pop. (1901) 28,698. Consult: Tudor, *The Orkneys and Shetland* (1883); Wallace, *The Isles of Orkney* (1884).

ORLANDO FURIOSO, *awr-lân'dō fô-rē-ō'sō* (Italian 'Orlando Mad,' or 'Mad Roland'), a romantic poem by Ariosto, of which 40 cantos were published in 1516, and to which the author added six more, the whole poem being published in 1532. It is a continuation of Boiardo's *Orlando Innamorato* (*Orlando in Love*), and is a somewhat ironical romance of chivalry. See ARIOSTO, LUDOVICO; BOIARDO, MATTEO MARIA.

ORLANDO INNAMORATO: *ēn-nâ-mō-râ'tō* (Italian, 'Orlando in Love'), a poetical romance by Matteo Maria Boiardo (q.v.), the subject of which is the love of Orlando or Roland for Angelica. Unfinished by the author, it was continued by Ariosto in his *Orlando Furioso* (q.v.).

ORLE, n. *ŏrl* [F. *orle* or *ourlet*, a hem, a margin—from mid. L. *or'ula*, dim. of *ora*, an edge]: in *her.*, figure in the form of a fillet or border round a heraldic shield, but at a distance from the edges. It is one of the charges known under the name of sub-ordinaries: said to be the diminutive of a Bordure (q.v.), but differing from it in being detached from the sides of the shield. It may be the sole charge in a shield. An orle of heraldic charges of any kind denotes a certain number (generally eight) of these charges placed in orle. ORLE, or OR'LET, *-lĕt*, or OR'LO, n. *-lō*, in *arch.*, fillet under the ovolo of a capital.

ORLEANS, n. *ōr'lēnz* [*Orleans*, in France]: common variety of plum.

ORLEANS, *or-lā-ŏng':* important commercial town of France, cap. of the dept. of Loiret, and formerly cap. of the old province of Orleannais, which now forms the greater part of the depts. of Loiret, Eure-et-Loir, and Loir-et-Cher; on the right bank of the Loire, here crossed by a bridge of 9 arches; 75½ m. s.s.w. of Paris by railway. Pop. (1901) 67,539. Close to city is the Forest of Orleans, one of the largest in the country, 94,000 acres, planted with oak and other valuable trees. Orleans stands on the verge of a magnificent plain sloping toward the Loire, and watered by the Loire and Loiret; and is surrounded on the land-side by a wall and dry ditches, on either side of which are pleasantly shaded boulevards. Around it are eight prosperous and populous suburbs. Among its principal buildings are the cathedral, with

two lofty and elegant towers, one of the finest Gothic edifices in France; the tower; bishop's residence; the houses of Joan of Arc, of Agnes Sorel, of Diane de Poitiers, of François I., of Pothier: the numerous churches and hospitals; the *musée*, theatre, etc. The town contains three statues of Joan of Arc, of which the equestrian one was unveiled 1855. The situation of Orleans has many commercial advantages, from its position on a navigable river, on lines of railway which connect it with Paris and the great trading towns in s. France, and on the canal which connects the Loire with the Seine. Hosiery, cotton and linen goods, refined sugar, vinegar, bleached wax, leather, etc., are manufactured; and the trade is chiefly in stockings, sheepskins, wine, brandy, corn, and sugar.

Orleans, originally *Genabum*, afterward *Aureliani* (probably from Emperor Aurelian), of which the modern name is only a corruption, was besieged by Attila 451, but relieved by the Romans, who here defeated Attila. It afterward passed into the hands of the Franks, was taken by the Northmen 855, and again 865. In 1428 it was besieged by the English under the Duke of Bedford, but was delivered by Joan of Arc (q.v.), therefore named the Maid of Orleans. In the wars of the 16th c., Orleans suffered severely. It was taken by the Germans 1870, and was their centre of operations against the French army of the Loire.

ORLEANS', House of. See Bourbon.

ORLÉANS, Isle of: Canada, in the Saint Lawrence river, below Quebec and Levis, at the head of the estuary, 650 miles from the ocean at Cabot Strait. It is dependent to Montgomery county, is about 22 miles long by five to six broad, and has an area of 70 square miles. On account of its numerous grape vines Jacques Cartier first named it the Isle of Bacchus, in 1535. The soil is fertile, well-wooded, and fruit culture is the chief industry. The villages along its shores are popular picnic and summer resorts, and include Beaulieu, St. Pierre Ste. Famille, St. François, St. Jean, St. Laurent, d'Orléans being usually affixed to particularize them. General Wolfe encamped here in 1759 before the siege of Quebec Pop. about 6,000.

ORLEANS, Territory of: in American history, a name formerly applied to a section of the United States When the large tract of northwest territory was purchased from France by the United States in 1804, under the name of Louisiana, the district was divided by Congress into territories, called the District of Louisiana and the Territory of Orleans, the latter being the present area of the state of Louisiana. In February 1811, an act was passed 'to enable the people of the Territory of Orleans to form a constitution and State Government,' and on April 12, 1812, an act was passed for the admission of the state of Louisiana into the Union. See Louisiana.

ORLEANS', Jean Baptiste Gaston, Duc d': 1608, Apr. 25—1660, Feb. 2; b. Fontainebleau; third son of Henry IV. of France and Marie de' Medici. He possessed fair abilities, but his education was neglected. On his marriage with Marie of Bourbon, Duchess of Montpensier, 1626, he received the duchy of Orleans as appanage. His wife soon died, leaving one daughter, the celebrated Mademoiselle de Montpensier. His brother, Louis XIII., regarded him with dislike as heir-presumptive to the throne, the queen having no children; and his treatment at the hands of the king and of Richelieu led him to join with his mother in attempting the overthrow of that minister. He left the court with a number of other great nobles, 1631, Feb.; sought the support of the Duke of Lorraine, whose sister he married; and raised in the Spanish Netherlands a corps of 2,000 men, at the head of which he crossed the French frontier, assuming the title lieut.gen. of the kingdom; but was completely defeated by Marshal Schomberg at Castelnaudary, and fled to the Duke of Lorraine, whom he thereby involved in ruin. In 1634, however, he returned to the French court. Richelieu sought to have his marriage with Marguerite of Lorraine declared invalid; but after a long struggle, and much disputing among jurists and theologians, its validity was sustained. The duke was, however, compelled to leave France again in consequence of fresh intrigues against Richelieu. After Richelieu's death, a reconciliation was effected between him and his brother, the king, by the ministers Mazarin and Chavigny; and Louis XIII. appointed him lieut.gen. of the kingdom during the minority of Louis XIV. Mazarin and the queen-mother, Anne of Austria, attempting to assume all power to themselves, the duke placed himself at the head of the Fronde (q.v.); but, with his usual vacillating weakness and selfish sacrifice of his friends, soon made terms again with the court. Yet, when Mazarin returned from banishment 1652, the duke again assembled troops for the Prince of Condé, on which account, after the disturbances were ended, he was confined to his castle of Blois, where he died. He left three daughters by his second marriage.

ORLEANS', Louis Philippe Joseph, Duc d': 1747, Apr. 13—1793, Nov. 6; great-grandson of the regent Philippe, Duc d'Orleans. He possessed very good abilities; but early fell into gross debaucheries, in which he continued to the end of his career. Louis XVI. disliked him for his debased character, and the queen for his obtrusiveness. He became gradually estranged from the court, sought popularity and obtained it, and embraced the cause of American independence. In the assembly of notables 1787, he declared against the ministerial proposals; and when the king sought to overcome the resistance of the parliament by a *lit de justice*, he protested against the proceeding. On the assembly of the states-general, he took the popular side, and voted with the extreme Left in the national assembly; seeking at the

same time to please the populace by profuse expenditure, with the hope of being made lieut.gen. of the kingdom, or perhaps of opening for himself a way to the throne. When the insurrectionary movements began in Paris 1789, he promoted them by secret agents and money. The court sent him on an ostensibly diplomatic mission to England, from which he returned 1790, July, after more than six months' absence, and unscrupulously engaged in new intrigues hostile to the king. But he began to find that he himself was made the mere tool of a party, who availed themselves of his influence and wealth for their own purposes; and this discovery cooled his revolutionary fervor. He withdrew from the Jacobin Club, was reconciled to the king, and appeared at court; but was treated with such disrespect by the courtiers, that he turned away, and from that time followed in blind rage the stream of the revolution. He joined Danton's party, was concerned in insurrections, disclaimed all pretensions to the throne, renounced his titles, assumed the name Philippe Égalité, was addressed as Citizen Égalité, and was returned by the dept. Seine-et-Marne to the national convention, in which he took his place among the Mountain party. He voted for the death of the king, being, it is said, himself threatened with death by the Jacobins if he should do otherwise, but alleging his sense of duty and his belief that every one who did anything contrary to the sovereignty of the people deserved death. The vote was received with a cry of disgust, and by no means increased the safety of his own position. The Mountain party were dissatisfied with him, because he did not give up the whole of his immense wealth for party purposes. After the desertion of his son, the Duke de Chartres (see LOUIS PHILIPPE), the decree for the imprisonment of all the Bourbons was applied to him. He was thrown into prison with his family in Marseille, and was brought before the tribunal of the dept. of Bouches-du-Rhône on a charge of high treason He was acquitted, but the committee of public safety immediately brought him before the revolutionary tribunal in Paris; and 1793, Nov. 6, he was condemned, and the sentence was executed the same day, amid the execrations of the multitude which had so often applauded him.

OR'LEANS, MAID OF: see JOAN OF ARC.

ORLEANS', PHILIPPE, Duc D', Regent of France during the minority of Louis XV.: 1674, Aug. 4—1723, Dec. 2; son of Philippe, Duc d'Orleans, and grandson of Louis XIII. He possessed excellent talents, and made unusual attainments in science and belles-lettres; but his tutor, Cardinal Dubois (q.v.), did not scruple to minister to the strong passions of the young prince, and exercised a most pernicious influence over him. He gave himself up to debauchery. The king compelled him to marry Mademoiselle de Blois, the king's daughter by Madame de Montespan. He astonished and alarmed the court by protesting against his exclusion, by the testament of

Charles II., from all right of succession to the throne of Spain, and by the attention which he immediately began to give to military and political affairs. His military talents, however, led to his employment in the wars in Italy and in Spain; but his presence in Madrid after his victories was regarded with apprehension both by Philip V. and by Louis XIV. He had, indeed, formed the design of taking possession of the Spanish throne for himself. In consequence of this, he lived for some years in complete exile from the court, and much dreaded by it; spending his time both in vicious excesses and in the cultivation of the fine arts and the study of chemistry. This study afforded a pretext to Madame de Maintenon and her party for accusing him of poisoning the dauphin and others of the royal family, who died suddenly, and in rapid succession, of malignant fever, 1711. The king refused an investigation which the duke demanded. Louis, having legitimized his sons, the Duke of Maine and the Count of Toulouse, appointed the Duke of Orleans only pres. of the regency and not regent, giving the guardianship of his youthful heir and the command of the household troops to the Duke of Maine; but all this was set aside at the king's death, and the Duke of Orleans became sole regent. He was popular, and his first measures increased his popularity; but the financial affairs of the kingdom were perplexing, and the regent's adoption of the schemes of Law (q.v.) led to disastrous results. Meanwhile, 1718, Aug. 26, he held the famous *lit de justice*, in which he prohibited the parliament of Paris from meddling with financial or political affairs, and declared the legitimized sons of Louis XIV. incapable of succeeding to the throne. Dubois, who still possessed an unhappy influence over his former pupil, became prime minister, and eventually ruler of France; the regent, who was really a man of far higher abilities, neglecting all duties, and pursuing a course of profligacy almost unequalled in the worst instances of antiquity. His eldest daughter, the Duchess de Berry, followed his example, and brought herself to an early grave. Dubois, wishing to be made a cardinal, persuaded the regent to sacrifice the Jansenists, and to compel the parliament 1722 to recognize the bull *Unigenitus* (q.v.). After the king's coronation, 1723, Feb. 15, and the death of Dubois in Aug., the Duke of Orleans, though disliking public affairs, consented to become prime minister; but died Dec. 2 of the same year, physically exhausted by incessant debauchery. The influence of his religious and other opinions, and the example of his immoralities, powerfully tended to promote that state of things which eventually produced the horrors of the French Revolution.

ORLEANS CLOTH, *awr'lĕ-anz:* material for ladies' dresses, in which the warp is of cotton and the weft of worsted; so called from having been made first at Orleans in France; but it is now extensively manufactured at Bradford in Yorkshire, England.

ORLOFF, or ORLOV, *or-lof'*: Russian family that rose to eminence during the reign of Paul III., when one of its members, Count Gregori O., attracted the notice of the Grand Duchess Catharine, afterward Empress Catharine II., and succeeded Poniatowski as her favorite. It was Gregori who planned the murder of Peter III., and his brother Alexei who committed the deed; and both received high honors and rich rewards for this and other services. The flourishing family of the Counts Bobrinski resulted from Gregori's intercourse with the empress. The legitimate line of O. soon became extinct; but Feodor, brother of Gregori and Alexei, left four illegitimate sons, one of whom, Mikail, distinguished himself in the campaign of 1814; and another was Count Alexei O., the celebrated diplomatist. Count Alexei O. (1787–1861, May 20) signalized himself by courage and military talents during the French wars, negotiated the treaties of Adrianople (1829) and Unkiar-Skelessi (1833), and represented Russia at the London conference 1832 on the affairs of Belgium and Holland. In 1844 he was placed at the head of the secret police; and the ability and energy with which he directed its vast machinery rendered him the most dreaded official in Russia. He was high in the favor of Emperor Nicholas, who employed him in the negotiations with Austria previous to the Crimean war. In 1856 he sat in the congress of Paris as the representative of Russia, and on his return was made pres. of the grand council of the empire. He died at St. Petersburg.

ORLOP, n. *ŏr'lŏp* [Ger. *überlauf*, the deck of a ship—from *überlaufen*, to run over the whole surface: Dut. *overloop*—from *over*, over; *loopen*, to run]: in a *ship*, the lowest deck, immediately above the hold. On it are stowed the cables, sails, etc. In ships of war it contains the magazine, bread-room, and various store-rooms; and is used in time of action for reception and treatment of the wounded, as, being below the water-line, it is the safest part of the ship.

ORME'S HEAD, *awrmz hĕd*, GREAT: headland in the n.e. of Caernarvonshire, n. Wales, five m. n.n.w. of Conway; lat 55° 20′ n., long. 3° 51′ w. It is an enormous mass of limestone rock, surmounted by a light-house, and forming the extreme point of the w. shore of Orme's Bay.—Little Orme's Head forms the e. extremity of the same bay.

ORMOLU, n. *ŏr'mŏ-lô'* [Fr. *or*, gold; *moulu*, ground, bruised: L. *aurum*, gold; *molĕre*, to grind]: gilt bronze; gold-colored brass, or mosaic gold. It is a variety of brass, consisting of zinc 25 parts and copper 75 parts, which has a nearer resemblance in color to gold than ordinary Brass (q.v.). It is much used for castings of ornaments for furniture, candelabras, etc. When the casting is made, its color is brought out by a *pickle* of dilute sulphuric acid, after which the acid is removed by water, and a liquor varnish is put on to keep it from tarnishing. ORMOLU VARNISH, a copper, bronze, or imitation gold varnish.

ORMONDE, *awr'mond*, JAMES BUTLER, Duke of: 1610 (about Oct. 19)—1688, July 21; b. London; first of the ancient Anglo-Irish family of Butler on whom the ducal title was conferred. The family was of illustrious antiquity. Genealogical legend carried it back to the dukes of Normandy before the Conquest, and it is certain that at the dawn of the 13th c. it held the hereditary office of royal cup-bearer or *butler*, whence the family name.—His father, son of the celebrated Walter, Earl of O., was drowned in crossing the Channel; and the old earl having incurred the displeasure of King James I., and being thrown into prison, James Butler, who on his father's death became, as Viscount Thurles, the heir of the title, was seized as a royal ward, and placed under the guardianship of the Abp. of Canterbury. On the restoration of his grandfather to liberty, he also was released; and in his 20th year he married his cousin, Lady Elizabeth Preston, and 1632 succeeded, on his grandfather's death, to the earldom and estates of O. During the Strafford administration in Ireland, O. distinguished himself so much, that on Strafford's recall he recommended O. to the king; and in the rebellion of 1640, O. was appointed to the chief command of the army. During the troubled times which followed, he conducted himself with undoubted ability, though, as a necessary consequence of numberless divisions and sub-divisions of party which then prevailed in Ireland, he failed to satisfy any one of the conflicting sections; and when, 1643, he concluded an armistice, his policy was loudly condemned as well by the friends as by the enemies of the royalist party in England. During the long contest of Charles with the parliament, O. continued to uphold the royal interest in his Irish govt.; and when the last crisis of the king's fortunes came, he resigned his Irish command, and retired to France, whence he returned to Ireland with the almost desperate design of restoring the royal authority, but, after a gallant but unequal struggle, was compelled, in 1650, to retire once more to France. His services to the royal cause continued unremitting during his exile; and at the Restoration he accompanied Charles II. on his return, and was rewarded for his fidelity by the ducal title of Ormonde. His after-life was less eventful, though he twice again returned to the government of Ireland. In 1679 the well-known attempt on the life of Ormonde was made by the notorious Col. Blood (q.v.). O., returning from a civic festival, was attacked by Blood and a party of ruffians, and was dragged from his coach with the intention of his being hanged at Tyburn. The attempt drew additional interest from its being commonly supposed to have been instigated by the profligate Duke of Buckingham, O.'s inveterate foe. The duke escaped uninjured. His letters and other papers are of deep historical interest. See Carte's *Life of Ormonde.*

ORMSKIRK, *awrmz'kêrk:* market-town of England, in Lancashire, in the centre of a rich and populous agricultural district, 12 m. n. of Liverpool by the Lancashire and Yorkshire railway. The parish church has both a tower and spire. Silk-weaving, rope-making, basket-making, and brewing are principal industries. There are large collieries in the vicinity. Pop. about 7,000.

ORMUZ, *awr'mŭz*, or HORMUZ, *hawr-môz':* small island in the Strait of O., at the entrance of the Persian Gulf, within 10 m. of the Persian coast; about 12 m. in circumference. It belonged to the imaum of Muscat till 1854; in the 16th c. it was taken by the Portuguese, and being made by them an entrepôt for goods from India, Persia, and Turkestan, it became important, and the *town* of O. rose in population until it had 40,000 inhabitants. The town was demolished, 1622, by Shah Abbás, assisted by the English, and its trade was removed to Gombroon (q.v.).

ORMUZD, *awr'mŭzd* or *awr'môzd* (or AHURMAZD, or AURAMAZDA, or HORMAZD, or ORMAZD); corrupted from Ahurô-Mazdaô, i.e., that Ahura (Vedic Asura) or 'Spiritual Being' who is called Mazdaô (i.e., Vedic Medhâs) = 'Creator of all things': the supreme deity of the ancient Persians, and of their descendants, the Guebres and Parsees. It was at first emphatically employed in this sense by Zoroaster, or Zarathustra Spitama. O. is, according to Zoroaster's original doctrine, the creator of the earthly and spiritual life, the lord of the whole universe, in whose hands are all creatures. He is the light and the source of light, the wisdom and the intellect, and is in the possession of all good things, such as 'the good mind,' 'immortality,' 'wholesomeness,' 'the best truth,' 'abundance,' etc.; which gifts he bestows on the pure in thoughts, deeds, and words, while the wicked are punished by him according to their wickedness. ('Father of the pure creatures at the beginning, who hath created the way of the sun, of the stars, who causeth the moon to wax and to wane. . . . He holdeth the earth and the unsupported [heavenly bodies?], the waters, and the trees, and giveth swiftness to the wind and the clouds. . . . The creator of the good mind, the working good, hath made light as well as darkness, sleep and waking, the morning dawns, the noons, the nights,' etc. —*Yazna*, 43.) Sprung from Zarvan-Akarana (the boundless time), i.e., being from eternity, self-existing, neither born nor created, O. was conceived as uniting within himself—like man and everything else existing—the two primeval principles of good and evil—the Çpento-mainyus., i.e., the white, holy spirit; and the Angrô-mainyus (corrupted into Ahriman) = the dark spirit. This Zoroastrian conception of the two sides of the Divine Being —itself one and indivisible—has, however, in the course of time, partly through misunderstandings and wilfully false interpretations, undergone important changes.

While the Zarvan-Akarana was transformed by the Magi —in opposition to the Zendiks—into the Supreme Being itself, the philosophical notion of a duality in O. became the theological dogma of god and devil, jealous of each other's power, bent on the destruction of each other's works, consequently in constant war with each other, they and their armies. Both are—according to this corrupted view of later times, by means of which the genuine view has been forgotten till our day—supreme rulers; both have their fixed number of councilors (sprung from an egg, *Plut. Isis and Osiris*), who are the actual governors of the whole universe, each in his special province—which councilors, however, are neither more nor less than certain abstract ideas of Zoroaster. One personal archangel alone is assumed by the latter —viz., Sraosha (Serosh, cf. Skr. Shruti), i.e., hearing, tradition. He is vested with very high powers, and stands between O. and man; he is the teacher of good religion; he shows the way to heaven, and pronounces judgment over human actions after death. He is the personification of the whole Divine worship and its outward manifestations, the symbols, prayers, sacrifices, rites, etc., and the chief combatant of the influence of the Devas, who stand symbolically for the Brahmanic religion. O. is represented as sitting upon a throne of light, as a venerable man, or seated upon a bull, etc.— For further particulars about the seasons and the manner of his worship, as well as the general relations between his and the Brahmanic religion (both the result of a prehistoric conflict between the Iranians and those Arian brother-tribes who immigrated into Hindustan proper), see PARSEES: PERSIA: ZOROASTER.

ORNAMENT, n. *ŏr'nă-mĕnt* [L. *ornamentum*, a decoration—from *orno*, I decorate: It. *ornamento*: F. *ornement*]: something that beautifies and adorns; embellishment; additional beauty: V. *ŏr-nă-mĕnt'*, to render more beautiful or attractive to the eye; to embellish. OR'NAMENTING, imp. OR'NAMENTED, pp. OR'NAMENT'AL, a. *-ăl*, serving to decorate or adorn. OR'NAMENT'ALLY, ad. *-lĭ* OR'NAMENTA'TION, n. *-tā'shŭn*, decoration; embellishment (see below). OR'NAMEN'TOR, n. *-tėr*, a decorator; a finisher of articles.—SYN. of 'ornament, v.': to adorn; decorate; beautify; bedeck.

ORNAMENTA'TION, or DECORA'TION; in Architecture: something added to the simple constructive features, or to the form given to those features, for the purpose of making them beautiful or elegant. Thus, the Doric shaft, while answering the constructive purposes of a simple square or round pier, has flutting as its O.; and its capital, with its beautifully proportioned echinus and abacus, supports, as a plain slab would do, the weight of the entablature. The other classic orders illustrate this in a richer manner. Thus, the Corinthian column, with its fluted and elegant shaft, resting on an ornamented base, and crowned by an ornamented capital, takes the

place of what might have been, had utility alone been consulted, a plain pier of rubble-work, with a rough stone to rest upon, and another on the top to receive the load.

In classic architecture, as in every good style, the same principle pervades all the ornamental features—viz., *that they are constructive features ornamented in a manner suitable to their use*, e.g., a column, being a member for support, should be of such a form as to denote this; the constructive use of a cornice being to protect the top of the wall, and to shield the front of it from the rain and sun, it should be made of such form as to do this, and also to *look* as if it did it—to express its purpose. In classic architecture, the cornice consists of several members, in which the constructive decoration is well seen; the mutules and modillions beautifully indicating in an ornamental manner their original use, while the leaf enrichments of the small moldings give life and animation to the building. In mediæval art the same principle prevails in much greater degree, and over a more complex system of construction. The shafts, with their elegant and purpose-like bases and caps, are arranged so that each supports a separate member of the vaulting. The arch moldings are divided to indicate the rings of their constructive formation. The buttresses, so elegant in outline, express the part which they serve in supporting the vaulting; the pinnacles, with their ornamental finials, are the decorated dead-weights which steady the buttresses. The foliage and smaller ornament also is beautifully and suitably applied, as the growth and vigor of the supporting capitals and corbels, and the running foliage of the string-courses, arch-moldings, etc., fully illustrate.

There are, no doubt, many styles of art to which these remarks scarcely apply, e.g., the Assyrian, Egyptian, and Hindu styles, in which we find many features applied in a manner meant to be ornamental, though actually contrary to their constructive use. In these styles (also in Greek architecture), human figures, bulls, and other animals are placed as columns to carry the weight of a superincumbent mass. This is evidently wrong in principle, except when the figure is placed in an attitude to indicate that it is supporting a weight, as the Greek Atlantes do; but in the former cases, religious notions seem to have overcome true artistic feeling. There are also many forms of O. used in all styles, the origin of which is obscure, and their advantage doubtful, e.g., the zigzag, chevron, billet, etc., so common in early mediæval art, and the scrolls of Ionic and Indian art, and the complications of the interlacing work of the North in the middle ages. Such things may be admissible in colored decoration, such as the confused patterns of Saracenic art and the shell-patterns of Indian art; but where ornamental *form* is wanted, unless the requirements of the construction are carefully followed as the guide to the O., all principle is lost, and the ornament runs wild.

This has frequently occurred in the history of art, markedly in the art of the Renaissance.

The material in use also must have an influence on the form and style of the ornament. Thus, stone-carving and metal-work evidently require different treatment. Fac-simile leaves might be formed in iron, but could not be so carved in stone. This constructive element should be carefully attended to in designing. All imitative art must be to some extent conventional. Natural objects, such as leaves, flowers, etc., cannot be copied literally; and in suiting the conventional treatment to the nature of the material used, lies the great skill of the artist.

ORNATE, a. *ŏr-nāt′* [L. *ornatus*, adorned, embellished: It. *ornare;* F. *orner*, to adorn]: splendidly adorned; decorated; beautiful. ORNATE′LY, ad. *-lĭ*. ORNATE′NESS, n. *-nĕs*, the state of being ornate.

ORNE, *awrn:* department of France formed out of the old provinces of Normandy and Perche, separated on the n. by the dept. of Calvados from the English Channel (La Manche); 2,350 sq. m., more than one-half cultivable land. A range of wooded hills, nowhere rising above 1,370 ft., extends across the s. of the dept. from e. to w. North of this range, the surface slopes toward the English Channel; s. of it, toward the Atlantic. The principal rivers are the O. (which gives name to the dept.), the Rille, the Sarthe, and Huisne. The climate is damp, though in general temperate, and the winters are severe. The soil is fertile, but agriculture is not advanced. The inhabitants consume one-third more grain than is grown on the land. There are several millions of apple and pear trees planted along the roads, etc., and cider is extensively made. Cattle, and horses of the purest Norman breed, are reared. Mining is an important industry; chief products are iron and copper; marble, granite, and other stones for building are quarried. The dept. is divided into four arrondissements—Alençon, Argentan, Domfront, and Mortagne; cap. Alençon. Pop. of dept. (1891) 354,387; (1901) 326,952.

ORNITHICHNITE, n. *ŏr′nĭ-thĭk′nīt* [Gr. *ornis* or *ornītha*, a bird; *ichnos*, the mark of a foot, a trace]: in *geol.*, footmarks found in mineral strata, supposed to be those of birds.

ORNITHOCOPROS, n. *ŏr′nĭ-thō-kŏp′rŏs* [Gr. *ornis* or *ornītha*, a bird; *kopros*, dung]: in *geol.*, the droppings or dung of birds—sometimes applied to guano.

ORNITHOIDICHNITES, n. plu. *ŏr′nĭ-thoy-dĭk′nīts* [Gr. *ornis* or *ornītha*, a bird; *eidos*, resemblance; *ichnos*, a footstep]: in *geol.*, bird-like footprints—a term denoting resemblance merely, without affirming that they are really the footmarks of a bird.

ORNITHOLITES, n. plu. *ŏr-nĭth′ŏ-līts* [Gr. *ornis* or *ornītha*, a bird; *lithos*, a stone]: in *geol.*, the remains of birds occurring in a fossil state.

ORNITHOLOGY.

ORNITHOLOGY, n. *ŏr′nĭ-thŏl′ŏ-jĭ* [Gr. *ornis* or *ornītha*, a bird; *logos*, discourse]: that branch of natural history which treats of the form, structure, habits, and uses of birds. ORNITHOLOGICAL, a. *ŏr′nĭ-thō-lŏj′ĭ-kăl*, pertaining to ornithology. OR′NITHOLOG′ICALLY, ad. *-lĭ*. OR′NITHOL′OGIST, n. *-thŏl′ŏ-jĭst*, one versed in ornithology.

Ornithology is susceptible of such a broad interpretation that it is difficult to define its limits with accuracy, and of late years certain of its branches have become to such an extent matters of popular interest that we are coming to use the term 'bird study' to distinguish them from purely scientific ornithology. Ornithology proper, then, may be said to treat of the classification of birds,—both the phylogeny of the group as a whole and the definition of the numerous species and varieties—which involves anatomical, morphological, embryological, and physiological investigations and studies of both the living and dead bird. Geographic distribution and migration (q.v.) also form an important branch of ornithology. See also BIRDS OF PASSAGE.

Structure.—See BIRDS; FLYING; FEATHERS; NESTS; DARWINIAN THEORY; BILL; REPRODUCTION; EGG; BRAIN; PLUMAGE; etc.; see also special articles on the various species of birds under their respective titles in this encyclopedia.

Classification.—From the time of Aristotle scientific literature has been full of attempts to classify birds. The earlier schemes naturally dealt with external characters only, and as feathers were common to all, the only available parts were the bill and feet. There were two grand divisions, water birds and land birds, while under these came the waders, swimmers, divers, etc.; the birds of prey, gallinaceous birds, *Fissirostres*, *Conirostres*, *Tenuirostres*, etc.

In 1813 Merrem proposed to separate the birds with a smooth breast-bone (ostriches, etc.) from the rest of the class—which all possess a keel on the sternum. This was an important advance, and the first recognition of the modern groups *Ratitæ* and *Carinatæ*. In 1827 a Frenchman, L'Herminier, made an extended study of the skeletal structure of birds and brought to light many points of relationship between birds hitherto regarded as distinct and *vice versa*. The cranes and herons were shown to be wrongly associated, and similarly the gulls and petrels, while the relationship between the gulls and the plover tribe was pointed out. Thus were the long accepted groups of 'waders' and 'swimmers' rudely shattered and the external resemblance in foot-structure was shown to be superficial.

The classification of birds, always a puzzle, now became still more complex, and all parts of the avian structure were investigated in the hope of reaching some set of characters that would prove the solution of the problem.

Nitzsch made numerous anatomical investigations, but his most important discoveries were in connection with pterylography, showing that the number and shape of the feather-tracts differed widely in different groups. McGillivray and Müller studied the soft anatomy, and the latter was the first to divide the passerine birds into *Oscines* (singing birds) and *Clamatores*, by pointing out the difference in the number and character of the vocal muscles. Sundevall considered the physiological side of the subject and was the first to define Altricial and Precocial birds—those respectively that are hatched helpless and reared in a nest and those that run about as soon as leaving the egg. Up to this time classification meant a search for similarities with the object of arranging species in definite groups and families. There now came a revolution in the classification of birds, as well as of other groups. In 1859 Darwin published his *Origin of Species*, and his work, as well as that of Alfred Russel Wallace, soon put classification in a new light. It was realized that the birds of to-day are the terminal branches of a great family tree of bird-life whose trunk and early limbs are far back in the geological past, where they merged into the trunk which has produced the modern reptiles. Some of our present bird-families, notably those most numerous in species, are comparatively recent developments, suited in every way to prevailing conditions; while others, usually with few representatives, are the remnants of ancient groups which belong much farther back on the tree, and have barely survived to the present time. The significance of fossil-forms now became evident, as well as the fact that birds could not be arranged in a lineal series and preserve their proper relationship. It was also clear that in tracing the phylogeny of birds all sorts of characters must be taken into consideration; since modification in one part may have been important at one time, or in one group, while in another group some other part was the seat of variation.

The principal contributors to the modern classification of birds are as follows:

Huxley in 1867 made a study of birds' skulls and demonstrated the importance of the arrangement of the bones of the palate as an aid to classification, defining the several types of palate-structure known as dromæognathous, desmognathous, schizognathous and ægithognathous. Garrod and Forbes made important additions to our knowledge of the muscular anatomy of birds, and in 1888 Fürbringer published probably the greatest treatise on avian phylogeny that has yet appeared. One of his most important discoveries was that of the descent of the ostriches and their allies from flying ancestors, showing them to be a degenerate and not a primitive group.

The present views of bird-classification are briefly as follows; We have two distinct branches of existing birds, the degenerate *Ratitæ* and the *Carinatæ*. The former

represented by four orders: 1, the Apteryxes of New Zealand ; 2, the cassowaries and emus of the Australian region; 3, the rheas of South America; and 4, the ostriches of Africa and Arabia.

Among the *Carinatæ* we have, first of all, the tinamous (*Crypturi*), a sharply defined group of birds recalling the gallinaceous type in external appearance, but with many points of resemblance to the *Ratitæ*. The penguins (*Sphenisci*) are a degenerate group of somewhat doubtful affinity, which Dr. Stejneger regards as differing more from any of the remaining birds than they do from each other; while other authorities place them as a distinct order, but in alliance with the loons. The latter, together with the grebes, form a natural order *Pygopodes*, while the petrels and albatrosses form another, *Tubinares*. The relationship of the auks (*Alcidæ*) has been in some doubt, but they are now most frequently placed near the gulls (*Gaviæ*). The latter have much in common with the plover and sandpipers (*Limicolæ*), and the sheathbill (*Chionis*) is in many respects intermediate; together with the bustard (*Otididæ*) they seem to form another natural order. Three other groups of 'water' birds constitute well defined groups: (1) The *Anseriformes*, ducks and geese, with the outlying horned screamers (*Palamedea*) and flamingos; (2) the storks and herons; and (3) the *Steganopodes*, or toti palmate swimmers; that is, cormorants, pelicans, etc. The last-named bear affinity to the hawk-tribe (*Accipitres*), which, with the American vultures, form a distinct group, their only other alliance being a possible one with the herons through the secretary bird (*Serpentaria*). We have left the cranes (*Gruidæ*), rails (*Rallidæ*), and trumpeters (*Psophiidæ*), which form an order *Gruiformes;* and several very puzzling forms which are generally placed in the neighborhood of the rails, though they have no near relatives, and some, at least, are generalized forms descended from earlier branches of the family tree and consequently exhibiting characters possessed by several distinct modern families. Such birds are the seriema, sun-bittern and kagu.

We next have the great gallinaceous assemblage, near which are placed the sand-grouse (*Pterocles*) and the pigeons (*Columbæ*). While that curious bird, the hoactzin, the representative of a distinct order, seems in some respects a connecting link between the gallinaceous type and the plantain-eaters (*Musophagidæ*), which stand near the cuckoos. From this point we pass to a number of groups, some of them very sharply defined, others less so; as, for instance, the woodpeckers (*Pici*), parrots (*Psittaci*), owls (*Striges*), whip-poor-wills, etc. (*Caprimulgi*), swifts (*Cypseli*), humming-birds (*Trochili*), etc. The complete separation of the owls from the hawks seems borne out by all modern researches, and their true position is probably in the neighborhood of the *Caprimulgi*. Last of all come the *Passeres*, divisible into two suborders and comprising far more species than

all the other orders combined, but so hopelessly are the species interrelated that only a very few clearly circumscribed families can be distinguished, of which the swallows (*Hirundinidæ*) are one of the best. Just which species of passerine birds are the highest; that is, the most specialized, is a matter concerning which there is much difference of opinion, and the thrushes, crows and finches have each been awarded the honor.

The following scheme, slightly modified from that of Dr. H. Gadow, will show approximately the present ideas of classification. Phylogenetically we may regard the *Colymbomorphæ* and *Pelagomorphæ* as branches of one stock, while the *Alectromorphæ* came away independently. The *Coraciimorphæ* have branched off from the last named, the hoactzin and the plaintain-eaters representing one point of alliance. The *Ratitæ*, on the other hand, are a degenerate group probably from the same ancestry as the tinamous.

RATITÆ.

The Ostrich tribe and certain Fossil allies.

CARINATÆ.

Colymbomorphæ:

I. Spheniscifórmes,—Penguins.

II. Colymbiformes,—Grebes and loons.

III. Procellariiformes,—Petrels and albatrosses.

Pelagomorphæ:

I. Ciconiiformes,—1, Cormorants, etc.; 2, herons; 3, storks.

II. Anseriformes,—1, Palamedea; 2, ducks and geese; 3, flamingos.

III. Falconiformes,—1, Cathartæ; 2, hawks, etc.

Alectromorphæ:

I. Tinamiformes,—Tinamous.

II. Galliformes,—1, Hemipods; 2, gallinæ; 3, hoactzin; 4, sand grouse; 5, pigeons.

III. Gruiformes,—1, Sun-bitterns; 2, rails; 3, cranes; 4, trumpeters; 5, seriema.

IV. Charadiiformes,—1, plovers, etc.; 2, gulls and auks.

Coraciimorphæ:

I. Cuculiformes,—1, cuckoos, etc.; 2, parrots.

II. Coraciiformes,—1, Coraciæ; 2, owls; 3, caprimulgi; 4, swifts; 5, colies; 6, trogons; 7, woodpeckers.

III. Passeriformes,—1, Eurylæmidæ; 2, clamatores; 3, menuridæ; 4, oscines.

Bibliography.—General works are Gadow, Brehm's *Thierreich* (Vögel); Newton, *Dictionary of Birds;* British Museum, *Catalogue of Birds;* Coues, *Key to North American Birds;* and Cassels, the Royal, the Standard and the Cambridge *Natural Histories*, especially Evans. *Birds* (1900), in the last named series. Newton's *Dictionary* (1896) contains an immense bibliography relating to systematic and faunistic ornithology. For the United States the early standard works were the *Ornithologies* of Audubon, Wilson and Nuttall. The publication by Spencer F. Baird (1859) of the 8th volume of

the *Pacific Railway Reports*, dealing with the birds of the country in accordance with advanced knowledge, started a new epoch in the study. This was stimulated again by the publication, first in 1872, of Elliott Coues' *Key to North American Birds*, which has since passed through many editions. The most important and latest manual is Robert Ridgway's *Birds of North and Middle America*, begun in 1901.

ORNITHOMANCY, n. *ŏr-nĭth'ō-măn-sĭ* [Gr. *ornis* or *ornītha*, a bird; *manteï'a*, divination]: divination by the flight of birds.

ORNITHOPTERUS, n. *or-nĭ-thŏp'tėr-ŭs* [prefix *ornitho-*; Gr. *pteron*, a wing]: in *paleon.*, an imperfectly known genus of Pterosauria (q.v.). It comprises forms having a wing-finger with only two phalanges. It is possibly a transition form between the Reptilia and Aves, or it may be really referable to the latter class.

ORNITHORHYNCHUS, n. *ŏr'nĭth-ō-rĭng'kŭs* [Gr. *ornis* or *ornītha*, a bird; *rhungchos*, the snout of a hog]: fur-covered animal, web-footed, with a flat, horny beak like a duck, peculiar to the fresh-water rivers of Australia and Tasmania—known also by the names of *duck-bill*, *water-mole*, and *platypus*. See DUCK-BILL.

ORNITHOSAU'RIANS. See PTERODACTYL.

ORNITHOSCELIDA, n. plu. *ŏr'nĭth-ō-skĕl'ĭ-dă* [Gr. *ornis* or *ornītha*, a bird; *skĕlos*, a leg, a foot]: an extinct group of reptiles having intimate relations both with avian and reptilian types.

ORNITHOS'TOMA: the generic name of a huge pterodactyl from the Cretaceous rocks of Kansas, which is probably identical with *Pteranodon*.

ORNITHOTOMY, n. *or-nĭ-thŏt'o-mĭ* [prefix *ornitho-*; Gr. *tomē*, a cutting]: in *nat. science*, the knowledge or practice of the anatomy of birds.

ORNITHURIC ACID, n. *or-nĭ-thūr'ĭk ăs'ĭd* [prefix *ornith-*; Eng. *uric*]: in *chem.*, $C_{19}H_{20}N_2O_4$; an acid extracted by alcohol from the excrement of birds living on food mixed with benzoic acid. It crystallizes in colorless, anhydrous needles, melting at 182°; slightly soluble in water, very soluble in hot alcohol, but insoluble in ether. It forms soluble salt with the alkalies and alkaline earths, insoluble salts with the oxides of the heavy metals. ORNITHUR'ATE, n. a salt of ornithuric acid.

ORNUS, n. *or'nŭs* [L.]: in *bot.*, flowering ash; a genus of *Fraxineæ*. *Ornus europœa* and *Ornus rotundifolia*, found in the s. of Europe, are both called the manna ash.

ORO-, prefix *ŏr-o* [Gr. *oros*, a mountain]: pertaining to or connected with mountains; inhabiting mountains.

ORO-, prefix *ōr-ō* [L. *os*, *oris*, the mouth]: belonging to or connected with the mouth.

OROBANCHEÆ, *ŏr-o-băng′kē-ē*, or OROBANCHACEÆ, *ŏr-o-băng-kā′sē-ē:* natural order of exogenous plants, all herbaceous, and destitute of true leaves, but having their stems covered with brown or colorless scales. They all grow parasitically upon the roots of other plants. The calyx is divided, persistent, inferior; the corolla monopetalous, hypogynous, and irregular. The stamens are four, two long and two short; the ovary is 1-celled, seated in a fleshy disk, composed of two carpels, with one style. The fruit is capsular, inclosed within the withered corolla, 1-celled, 2-valved. The seeds are numerous, and very minute. There are about 120 known species, natives

Broom-rape (*Orobanche rubra*):

a, the top of the stem, with bracts and flowers; *b*, the base of the stem, with scales; *c*, the corolla, cut open, showing stamens; *d*, the middle segment of the lower lip of the corolla, magnified, showing the beautiful fringe of gland-bearing hairs; *e*, capsule.

chiefly of temperate climates, and generally characterized by astringency and bitterness, on account of which some have been used in medicine (see CANCER ROOT). To some species of the genus *Orobanche*, or BROOM-RAPE, important medicinal virtues were formerly erroneously ascribed. The enlarged base or root-stock of a species of *Orobanche* is cooked or dried, and eaten by the Indians of n.w. parts of America.

OROBUS, *ŏr′o-bŭs:* genus of plants of natural order *Leguminosæ*, suborder *Papilionaceæ*, allied to Vetches, and sometimes called Bitter Vetch; the style linear, downy beneath the stigma; the calyx obtuse at the base and oblique at the mouth; its upper segments deeper and shorter; the pod 1-celled, 2-valved; the leaves pinnate, without tendrils. The species are perennial her-

Bitter Vetch (*Orobus tuberosus*):
a, standard of the corolla.

baceous plants, natives chiefly of Europe. They afford good food for cattle. Of some species, the tubers have a sweet taste, resembling that of licorice; they are also bruised and steeped in water in parts of the Highlands of Scotland, to make a fermented liquor; they are well flavored and nutritious when boiled or roasted, and are used in Scotland, Holland, Belgium, and other countries.

OROGRAPHY, n. *ō-rŏg′ră-fĭ* [Gr. *oros*, a mountain; *graphō*, I write]: the science which describes or treats of mountains with regard to their height, etc., and of the mountain-systems of the globe; also, in same sense, Orology, n. *ō-rŏl′ŏ-jĭ* [Gr. *oros*, a mountain, and *logos*, discourse]. Orological, a. *ō′rō-lŏj′ĭ-kăl*, pertaining to a description of the mountains and mountain-systems of the globe. Orologist, n. *ō-rŏl′ŏ-jĭst*, one who describes mountains.

OROHIP′PUS: see Horse, Fossil.

OROIDE: see Oreide.

OROLOGY: see Orography.

ORONTES, *ō-rŏn′tēz:* ancient name of a river in Syria, now called *Nahr-el-Asi.* It rises in the highest part of Cœle-Syria, near Baalbek, flows n. between the mountains of Libanus and Anti-Libanus, as far as the city of Antioch, then w. to the Mediterranean Sea, after a course of 240 m., passing by a cross-valley, through the mountains of the Syrian coast. Its lower course is remarkably beautiful, surpassing everything else in Syrian scenery. Its rocky banks are 300 ft. high, and the windings of the river show them to the greatest advantage. Myrtle-bushes, laurels, figs, wild-vines, arbutus, dwarf-oaks, and sycamores (*Acer pseudo-platanus*) are scattered in picturesque confusion. Here and there the eye catches a glimpse of some cavern mouth or ivy-matted precipice, while from the abyss beneath ascends the unceasing roar of the impatient stream. The country through which it flows is of great fertility, and in many parts well cultivated.

OROOMIAH, *ō-rô-mē′â*, or URUMEYAH, *ô-rô-mē′yâ:* town of Persia, 10 m. w. of the Lake of O., in a wide and fertile plain. It is surrounded by a mud wall and moat, but has no gates. Extensive fruit and vegetable gardens are within and without the walls. The houses of the wealthier citizens are lofty, spacious, and sumptuously furnished; and many of the poorer sort are tastefully adorned with flowers and vines. O. is the seat of a Nestorian bishop and of a flourishing American mission: many of the people are Nestorian Christians. O. was anciently known as *Thabarma* or *Thebarmæ*, and was said to be the birthplace of Zoroaster (q.v.).—Pop. about 50,000.

OROOMI′AH (or URUMEYAH, or URUMIJAH, *ô-rô-mē′yâ*, or URMEA, *ôr-mē′â*) LAKE; called also the *Lake of Maragha* (q.v.), *Lake of Tabriz*, and, by the neighboring peoples, *Kapauta* [Armen. *kapoit*, blue]: principal lake of Persia; in the west of Azerbijan, about 34 m. w. from Tabriz. It is 4,320 ft. above sea-level, about 80 m. long from n. to s., has average width of 25 m.; area more than 1,900 Eng. sq. m. It is one of that class of lakes which receive but do not emit streams; and though its feeders include such rivers as the Aji-su, 180 m. long, the Jagetu, 140 m., and the Ta-tu, 90 m., its average depth is only 12 ft. The water is largely impregnated with saline substances (according to one authority, the salts constitute 25 per cent. of the whole weight), and is so heavy as to be little ruffled by the strongest wind. No fish or mollusca are found in it. Six large isles, and a multitude of islets and rocks, show themselves just above its surface, being mostly grouped together near its centre. The lake is fast drying up, leaving a gradually widening beach of thick saline incrustation, which supplies with salt the whole of Kurdistan. The lake was known in ancient times as *Matiana* or *Mantiana.*

OROSIUS, *ō-rō'sĭ-ŭs*, PAULUS: Spanish presbyter and historian: born at Tarragona, toward the end of the 4th c. He went to Africa about 413, where he made the acquaintance of St. Augustine; and thence to Palestine, to study under St. Jerome, then living at Bethlehem. He finally settled in n. Africa, where probably he died, at a date not known. His chief work, the *Historiarum adversus Paganos Libri* 7, begins with the creation and goes down to 417. It is apologetic in design, being intended to refute the notion, then current among the pagans, that the misfortunes of the Roman empire and the wretchedness of the great masses were owing to the anger of the gods at the abandonment of their worship and the profanation of their altars. The work is a trivial, inaccurate, uncritical miscellany of facts, culled from such second-rate authorities as Justin and Eutropius; the style is elegant, but also, as Bacon says, 'watery.' Yet it has obtained a place in literature from being a favorite text-book of universal history during the middle ages, and had the honor of being translated into Anglo-Saxon by the English Alfred. Some manuscripts bear the puzzling title of *Hormesta* or *Ormista*, conjectured by some to be a corruption of Or. M. ist.—that is, *Orosii Mundi Historia* (Orosius's History of the World). The editio princeps of the work appeared at Vienna 1471; the best ed. is that of Havercamp (Lug. Bat. 4to, 1738). Other writings of O.'s are *Liber Apologeticus de Arbitrii Libertate*, an anti-Pelagian treatise; *Commonitorium ad Augustinum*, an explanation of the state of religious parties in Spain in his time. Editions of the *Historia* were published by Havercamp (1738 and 67) and Zangemeister (1881). See Mörner's work on Orosius.

OROSZHAZA, *ō-rŏsh-hâ'zŏh:* thriving town of Hungary, county of Békés Csanad, 31 m. n.e. from Szegedin. Pop. (1880) 18,032; (1890) 19,956.

OROTAVA, *ō-rō-tâ'vâ:* town on the n. coast of Teneriffe, one of the Canary Islands. It is below the Peak, in one of the most fertile, pleasant, and healthful districts in the world. It contains several beautiful churches, the residence of the governor, and the citadel. There are fishery and trade in wine. Pop. about 9,000.

OROTUND, a. *ŏr-ō-tŭnd'* [corrupted from L. *ore rotun'do*, with a full, round, or polished mouth—from *os*, a mouth—gen. *oris; rotundus*, round]: said of the utterance of letters or words with fulness, clearness, and strength. OR'OTUN'DITY, n. *-dĭ-tĭ*, the manner of uttering words with fulness and clearness.

ORPHAN, n. *ŏr′făn* [OF. *orphanin*—from mid. L. *orphănus*—from Gr. *orphănos*, deprived of either parent; connected with L. *orbus*, bereft: F. *orphelin*, an orphan]: a child bereaved of father or mother, or of both—more usually of both: ADJ. bereaved of parents. ORPHANAGE, n. *ŏr′făn-āj*, state of an orphan: an asylum for orphans. ORPHANED, a. *ŏr′fănd*, bereft of parents. ORPHANS, in *chh. hist.*, a party of Hussites who refused to follow Procopius or to elect any special leader after the death of Ziska, and called themselves orphans because they had lost their spiritual father. OR′PHANS' COURT, n. a court in some of the states, having jurisdiction over the persons and estates of orphans.

OR′PHAN HOUSE: see MÜLLER, GEORGE.

ORPHEAN, a. *awr-fē′ăn* [L. *Orpheus*, famous poet and musician of antiquity]: pertaining to Orpheus, *awr′fūs;* musical; poetical. ORPHEON, n. *awr′fē-ŏn*, a musical instrument. ORPHIC, a. *awr′fĭc*, of or pertaining to Orpheus; Orphean; belonging to or connected with Orphism. ORPHISM, in *compar. religion*, the doctrines of a Greek school or sect, said to have been founded by the mythic Orpheus (q.v.).

ORPHEUS, *awr′fūs* or *awr′fē-ŭs* (supposed by some to be the Vedic Ribhu or Arbhu, an epithet both of Indra and the Sun): mythic figure, whose name is of frequent occurrence in anc. Greek lore. The early legends call him a son of Apollo and the Muse Calliope, or of Œagrus and Clio, or Polymnia. His native country is Thracia, where many different localities were pointed out as his birthplace—e.g., the Mounts of Olympus and Pangæus, the river Enipeus, the promontory of Serrhium, and several cities. Apollo bestows on him the lyre, which Hermes invented, and by its music O. moves men and beasts, the birds in the air, the fishes in the deep, the trees, and the rocks. He accompanies the Argonauts in their expedition, and the power of his music wards off all mishaps and disasters, rocking monsters to sleep and stopping cliffs in their downward rush. His wife, Eurydice (? = Skr. Uru, Dawn), is bitten by a serpent (? = Night), and dies. O. follows her into Hades; and so powerful are his 'golden tones,' that even stern Pluto and Proserpina are moved to pity; while Tantalus forgets his thirst, Ixion's wheel ceases to revolve, and the Danaïdes stop in their wearisome task. He is allowed to take her back into the 'light of heaven,' but he must not look around while they ascend. Love or doubt, however, draws his eyes toward her, and she is lost to him forever (? = first rays of the sun gleaming at the dawn make it disappear or melt into day). His death is sudden and violent. According to some accounts, it is the thunderbolt of Zeus that cuts him off, because he reveals the divine mysteries; according to others, it is Dionysus, who, angry at his refusing to worship him, causes the Menades to tear him to pieces, which pieces are collected and buried by the Muses in tearful piety at Leibethra, at

the foot of Olympus, where a nightingale sings over his grave. Others, again, make the Thracian women divide his limbs between them, either from excessive madness of unrequited love, or from anger at his drawing their husbands away from them. Thus far, legend and art, in manifold hues and varieties and shapes, treat of O. the fabulous. The faint glimmer of historical truth hidden beneath these myths becomes clearer in those records which speak of O. as a divine bard or priest in the service of Zagreus, the Thracian Dionysus, and founder of the Mysteries (q.v.); as the first musician, the first inaugurator of the rites of expiation and of the Mantic art, the inventor of letters and the heroic meter, and of everything that was supposed to have contributed to civilize and to initiate into a more humane worship the primitive inhabitants of Thracia and all Greece: a task to which O. was supposed to have devoted his life after his return with the Argonauts. A kind of monastic order sprang up in later times, calling itself after him, which combined with a sort of enthusiastic creed about the migration of souls, and other mystic doctrines, a semi-ascetic life. Abstinence from meat (not from wine), frequent purifications and other expiatory rites, incantations, the wearing of white garments and similar things —not unlike some of the Essenic manners and customs —were among their fundamental rules and ceremonies. But after a brief duration, the brotherhood, having during the last days of the Roman empire passed through the stage of conscious and very profitable jugglery, sank into oblivion, together with their 'orpheotelistic' formulas and sacrifices, and together with those joys of the celestial, and never-ending punishments of the infernal, regions which they promised to their rich dupes, according to the sums which they grudged or bestowed upon them.

O. has given the name to a special literature called the Orphic, the real origin of which, however, is (according to Ottfried Müller), like Orpheus's own history, 'unquestionably the darkest point in the entire history of early Greek poetry.' Like Olen, Linus, Philammon, Eumolpus, Musæus, and other legendary singers of prehistoric Greece, O. is supposed to have been 'the pupil of Apollo and the Muses,' and to have first composed certain hymns and songs used in the worship of a Dionysus, dwelling in the infernal regions, and in the initiations into the Eleusinian mysteries. A mere 'abstraction,' as it were, he was called the first poet of the heroic age, and though not mentioned before Ibycus, Pindar, Hellanicus, and the Athenian tragedians, he was yet placed anterior to both Homer and Hesiod. The fragments current under his name were collected first at the time of the Pisistratidæ, chiefly by Onomacritus; and these fragments grew under the hands of the Orphic brotherhood, aided by the Pythagoreans, to a vast literature of sacred mythological songs sung at the public games, chanted by the priests at their service, worked out for dramatic

and pantomimic purposes by the dramatists, commented upon, philosophized upon, and 'improved' by grammarians, philosophers, and theologians. Although authorities like Herodotus and Aristotle had already combated the supposed antiquity of the so-called Orphic myths and songs of their day, yet the entire enormous Orphic literature which had grown out of them retained its 'ancient' authority, not only with both the Hellenists and the church Fathers of the 3d and 4th c. after Christ (who, for their individual, albeit opposite, purposes, referred to it as the most authentic primitive source of Greek religion, from which Pythagoras, Heraclitus, Plato, had drawn their theological philosophy), but down almost to the last generation, when it was irrefutably proved to be in its main bulk, as far as it has survived, the production of those very 3d and 4th centuries, raised on a few scanty, primitive snatches. The most remarkable part of the Orphic literature is its Theogony, based mainly on that of Hesiod, with allegorizing and symbolizing tendencies, and with a desire to simplify the huge Olympic population by compressing several deities into a single one: see THEOGONY. Yet there is one figure which stands out here prominently—viz., Zagreus, the horned child of Zeus by his own daughter Persephone, who, killed by the Titans at the bidding of Here, is reborn by Semele as Dionysus (see BACCHUS).

Besides the fragments of the Theogony which have survived, embedded chiefly in the writings of the Neo-Platonists, are the *Argonautica*, a poem of the Byzantine period, consisting of 1,384 hexameters; further, a collection of 87 or 88 liturgical hymns; a work on the virtues of stones, called *Lythica*, etc. Other poems belonging to the Orphic Cycle, of which, however, only names have survived in most instances, are *Sacred Legends*, ascribed to Cercops; a Poem on Nature, called *Physica*, probably by Brontinus; *Bacchica*, supposed to be written by Avignota, daughter of Pythagoras; *Minyas*, or Orpheus's descent into the Hades; and other poetical productions by Zopyrus, Timocles, Nicias, Persinus, Prodicus, etc. The best edition of the Orphic fragments is that of G. Hermann (Leipzig 1805). The hymns have repeatedly been translated into English by T. Taylor and others. See Lobeck's *Aglaophamus* (1829); Gerhard, *O. und die Orphiker* (1861); and Schuster, *De Theogoniæ Orphicæ Indole* (Leipzig 1869).

ORPHREY, n. *or'frĭ* [F. *orfroi*, embroidered cloth-of-gold—from L. *aurum Phryg'ĭum*, Phrygian gold—that is, cloth embroidered in gold, for which the Phrygians were famous]: embroidered bands attached to an ecclesiastical vestment, especially to the cope from the neck downward in front.

ORPIMENT, n. *ŏr'pĭ-mĕnt* [a corruption of the L. *aurĭpigmen'tum*—from *aurum*, gold; *pigmen'tum*, a paint]: yellow sulphide of arsenic; the color called king's yellow: see ARSENIC.

ORPIN, n. *ŏr′pĭn* [contr. of *orpiment:* F. *orpin*]: a yellow or orange color of various degrees of intensity.

ORPINE, n. *ŏr′pĭn* [F. *orpin*, a plant: a corruption of *orpiment*, from the yellow color of some of the species]: a wild herbaceous plant with fleshy leaves, found abundantly in some parts of England, called also the rose plant; the *Sēdum telēphĭŭm*, ord. *Crassulācĕæ*, found growing upon stones, rocks, walls, and roofs of houses, and hence also called stone-crop.

ORR, *awr*, HUGH: 1717, Jan. 13—1798, Dec. 6; b. Lochwinoch, Scotland. When 20 years of age he came to Easton, Penn., where he remained a year, and then settled in Bridgewater, Mass. He had learned the trade of gunsmith, and soon began making scythes and axes. He put up the first trip-hammer, and was the first manufacturer of edged tools and firearms in the region. As early as 1748, he made 500 muskets for the province. A few years later, he invented a machine for separating the fibre from the woody stem of flax, and about 1786 he invented machines for manufacturing cotton. The legislature gave financial aid in the construction of the latter machines, and rewarded O. and his employés for their public spirit. During the revolution, O. made several pieces of artillery and cast a large number of cannon-balls. For several years he was a member of the state senate. He died at Bridgewater.

ORRA, a. *ŏr′rā* [see ORT]: in *Scot.*, odd; not matched; applied to a man employed at odd jobs about a farm.

ORRERY, n. *ŏr′rĕ-rĭ* [after the Earl of *Orrery*]: machine constructed for the purpose of exhibiting the motions of the planets round the sun, and of the satellites round their primaries, which was in high repute during the 18th and beginning of the 19th c., though now regarded as a mere toy. It was a combination of the old *Planetarium* (q.v.), with other machines which showed the motions of the earth, moon, and planetary satellites. Though the construction of a machine which would exhibit accurately the motions, distances, and magnitudes of the planets is impossible, yet an O. is of some use as giving a general notion of the planetary motions. A number of iron tubes equal in number to the planets, and of different dimensions, are placed one within the other; their lengths being arranged so that the innermost tube projects at both ends beyond the one next to it, that one similarly projects beyond the third, and so on. At one end of each tube, a rod is fixed at right angles, and a ball or lamp attached to its end: the lengths of the rods being proportional (or at least supposed to be so) to the radii of the planetary orbits. The other ends of the tubes form the axes of toothed wheels, which are connected either directly, or by combinations of toothed wheels, with a winch. The several combinations of wheels are so adjusted that the velocity of revolution of the rods is proportional to the times of revolution of the planets. On turning the winch, the whole apparatus is set in motion, and the balls or lamps (repre-

senting the planets) revolve round the centre, which is a fixed lamp (representing the sun), at different distances and with varying velocities. There are many nice arrangements, such as for producing elliptic motion, but these need not be described.

ORRIS, n. *ŏr'ĭs* [a corruption of *iris:* It. *irios* or *ireos*, orris-root]: name of certain species of the plant *iris* or flag-flower; natives of s. Europe, belonging to the division of the genus having bearded flowers, sword-shaped leaves, and scapes taller than the leaves—viz., *I. Florentina*, a species with white flowers; *I. pallida*, which has pale flowers; and *I. Germanica*, which has deep purple flowers. See IRIS. The flowers of all these species are fragrant. *I. Germanica* extends further n. than the other species, and its root is sometimes said to be more acrid. —*Orris-Root* is the dried root-stock (*rhizome*) of these species of *iris:* it was formerly used in many medicinal preparations as a stimulant, but is now almost entirely disused. It is sometimes chewed to sweeten an offensive breath. Its chief use is in perfumery. It has a pleasant smell of violets, which it acquires in drying. Hair and tooth powders, and oils, are often scented with it. A tincture of it, used as a scent, is often sold as *Essence of Violets.*

ORSAY, ALFRED GUILLAUME GABRIEL, Comte DE: see D'ORSAY.

ORSINI, *or-sē'nē*, FAMILY OF: one of the most famous families of the Italian nobility. It descended from a Roman family of rank and wealth which became prominent in the early part of the twelfth century. For brilliant service in the army, Giordano was created a cardinal 1145, and was sent by the pope on a mission to the German emperor 1152, his nephew, Matteo, meanwhile being prefect of Rome. A little later, one of the members of the family became a senator, and another, Celestine III., became the pope. Matteo the Great was senator, and secured large landed interests. Toward the close of the thirteenth century, Giovanni became pope, taking the name of Nicholas III., made powerful alliances, greatly increased the power and fortunes of the family, and brought it into sharp rivalry with the Colonnas. In the fierce quarrels of the Guelfs and the Ghibellines, the O. sided with the former, and the Colonnas with the latter. The O. had a castle on Lake Bracciano, and various other strongholds. Both the O. and the Colonna families incurred the enmity of Pope Alexander VI., and suffered greatly therefrom. With the exception of the Neapolitan, the various branches of the O. family have decayed. Pope Benedict XIII. belonged to this branch. The family seat is retained at Rome; but the principal residence is at Naples, where a beautiful palace is occupied.

ORSINI, *or-sē'nē*, FELICE: Italian revolutionist, remembered for his atrocious attempt on the life of the French emperor, Napoleon III.: 1819–1858, Mar. 13; b. Meldola, in the States of the Church; son of a conspirator, and early initiated into secret societies. Before he had reached his 20th year, he was condemned to the galleys for life. The amnesty of Pius IX. (1846) restored him to liberty, but he was continually engaged in revolutionary plots as an agitator in the interest of insurrection. He escaped from prison 1856, and found refuge in England; whence, near the end of 1857, he went to Paris to assassinate Louis Napoleon, whom he reckoned the great obstacle to the revolution in Italy. His associates in this diabolical design were persons named Pieri, Rudio, and Gomez. Providing themselves with bombs, they took up their station in a house close by the opera, and on the evening of 1858, Jan. 14, just as the carriage containing the emperor and empress was drawing up, they threw three of the deadly missiles under the carriage. The explosion wounded several people, one or two mortally; but the emperor and empress were unhurt. The assassins were arrested, tried, and sentenced; O., Pieri, and Rudio to capital punishment, Gomez to hard labor for life. Rudio's life was spared, at the intercession of the empress, but Pieri and O. were beheaded.

ORSOVA, *ŏr-sō'vâ:* name of two towns at the Iron Gates of the Danube (q.v.).—OLD O., a Hungarian town, is on an island, and is a station for the Danube steamers. Pop. 1,200.—NEW O., on the Servian side, is a fortified town. Pop. 3,000.

ORT, n. *ŏrt;* generally in plu. ORTS, *ŏrts* [prov. Dan. *oored;* Dut. *oorete*, fragments, remains: Fris. *orten*, to leave remnants in eating: Low Ger. *ort;* Scot. *worts*, fragments]: fragments and rejected parts that are left by an animal in feeding; the odds and ends that fall to the ground in working with any material: see ODDS AND ENDS (under ODD), note.

ORTELIUS, *or-tā'lĭ-ûs* (or OR'TELL, or OERTEL, *ör'tĕl*), ABRAHAM: 1527, Apr. 4—1598, June 28; b. Antwerp: one of the principal geographers of his time. He travelled in the Netherlands, Germany, England, Ireland, and Italy; was a close student, and issued 1570 the earliest modern atlas. This work contained nearly 100 maps, and passed through several editions during his life. Though the maps were imperfect, the text was carefully prepared. The value of the work was recognized, and led to the appointment of O. as geographer to Philip II. of Spain 1575. He issued a valuable work on ancient geog. 1578, and several other works which attained wide popularity. Of nearly all his books, second editions were demanded. He d. at Antwerp.

ORTHEZ, *or-tā′*: small town of France, dept. of Basses-Pyrénées, on the right bank of the Gave de Pau, 37 m. e. of Bayonne. Pop. about 5,000. The castle of Moncada, now reduced to a few ruined walls, overtopped by one stately tower, was built here 1240 by Gaston de Foix. In the immediate vicinity of the town, the British, under Wellington, gained a grand and decisive victory over the French, under Soult, 1814, Feb. 27.

ORTHIS, n. *ŏr′thĭs* [Gr. *orthos*, straight]: in *geol.*, large genus of fossil brachiopodous mollusca, found in the paleozoic rocks, most abundantly in the Silurian rocks, but ranging upward to the Permian series. The genus contains more than 100 species. ORTHISINA, n. *ŏr′thĭ-sī nă*, a sub-genus of preceding. ORTHITE, n. *ŏr′thīt*, a mineral of a blackish-brown color, occurring in straight, needle-shaped, or columnar masses in the granites of Scandinavia.

OR′THO-, prefix [Gr. *orthos*, straight, upright]: prefix used with words derived from the Greek and expressing straightness, uprightness, correctness, or regularity.

ORTHOCANTHUS, n. *ŏr′thō-kăn′thŭs* [Gr. *orthos*, straight; *akantha*, a thorn or spine]: in *geol.*, a genus of straight, cylindrical, fossil fin-spines, found in the Carboniferous formation.

ORTHOCERAS, n. *ŏr-thŏs′ĕr-ăs*, or ORTHOCERATITE, n. *ŏr′thō-sĕr′ă-tīt* [Gr. *orthos*, straight; *keras*, a horn]: extensive genus of cephalopodous mollusca, found in the paleozoic rocks, from the Lower Silurian to the Trias; having straight, chambered shells tapering to a point like a horn. It is nearly allied to the Nautilus, and is indeed, in its simplest forms, nothing more than an unrolled and straightened nautilus. The shell is straight, the siphuncle central, and the body chamber small. The members of the genus are the most widely distributed and the most abundant of any paleozoic fossils. Nearly 200 species have been described; but a considerable number of these have been separated into sub-genera, characterized chiefly by the form and size of the siphuncle. The family is termed ORTHOCERATIDÆ, n. *ŏr′thō-sĕr-ăt′ĭ-dē*.

ORTHOCLASE, n. *ŏr′thō-klāz* [Gr. *orthos*, straight; *klasis*, a fracture]: a mineralogical term for potash felspar, from its straight, flat fracture.

ORTHODOX, a. *ŏr′thŏ-dŏks* [F. *orthodoxe*—from Gr. *orthodŏxĭă*, sound opinion—from *orthos*, right, true; *doxa*, an opinion]: sound in the Christian faith, as taught in the formularies of any particular church; sound in opinion and doctrine; not heretical; not heterodox. ORTHODOXY, n. *ŏr′thŏ-dŏks-ĭ*, soundness of opinion or doctrine. The word has different meanings in different countries and times. In this country it is familiarly applied to a positively Calvinistic doctrinal system; in other countries to ecclesiastical organizations or doctrinal tenets as established by law.

ORTHODROMICS, n. plu. *ŏr'thō-drŏm'ĭks* [Gr. *orthos*, straight; *dromos*, a course]: the art of sailing on the arc of a great circle, being the shortest distance between any two points on the earth's surface; great-circle sailing; also called ORTHODROMY, n. *ŏr-thŏd'rŏ-mĭ*. OR'THODROM'IC, a. *-ĭk*, pertaining to great-circle sailing.

ORTHOEPY, n. *ŏr-thō'ĕ-pĭ* [Gr. *orthoepeia*, correct pronunciation—from *orthos*, right; *epos*, a word: F. *orthoépie*]: branch of grammar that treats of the correct pronunciation of the words of a language. OR'THOEP'IC, a. *-ĕp'ĭk*, or OR'THOEP'ICAL, a. *-ĭ-kăl*, pertaining to correct pronunciation. ORTHO'EPIST, n. *-ĕ-pĭst*, one well skilled in pronunciation.

ORTHOGAMY, n. *ŏr-thŏg'ă-mĭ* [Gr. *orthos*, right, straight; *gamĕō*, I marry]: in *bot.*, the method of fertilization in plants in which the pollen falls directly on the stigma.

ORTHOGNATHOUS, a. *ŏr-thŏg'nă-thŭs* [Gr. *orthos*, straight, erect; *gnathos*, a jaw]: possessing a skull in which the front of the head is in a line with the jaws, and does not recede backward from them; having a head in which the face is in a line with the forehead.

ORTHOGON, n. *ŏr'thō-gŏn* [Gr. *orthos*, right; *gōnĭă*, an angle]: a rectangular figure. ORTHOGONAL, a. *ŏr-thŏg'ŏ-năl*, rectangular; at right angles.

ORTHOGONAL TRAJECTORY: a curve which cuts at right angle all the curves of a system.

ORTHOGRAPHY, n. *ŏr-thŏg'ră-fĭ* [Gr. *orthographiă*—from *orthos*, straight, correct; *graphō*, I write: OF. *ortographie*]: the part of grammar which teaches how words should be spelled; the art of writing words with their proper letters according to the best use: in *arch.*, representation of the front or elevation of a building, or of a section of it. ORTHOGRAPHIC, a. *ŏr'thō-grăf'ĭk*, or OR'THOGRAPH'ICAL, a. *-ĭ-kăl*, written with their proper letters; in *arch.*, delineated according to the elevation, not the ground-plan. OR'THOGRAPH'ICALLY, ad. *-lĭ*. ORTHOG'RAPHER, n. *-thŏg'ră-fĕr*, or ORTHOG'RAPHIST, n. *-ră-fĭst*, one who spells according to the rules of grammar.

ORTHOG'RAPHY: branch of grammar that treats of the elementary sounds of a language, the signs or letters by which they are represented in writing, and the combinations of these signs to represent words; it includes also the right dividing of words into syllables (as when a word has to be divided at the end of a line), and punctuation. In a more restricted sense, O. is synonymous with the art of correct spelling. No part of grammar is less satisfactory than this. All alphabets were from the first both defective and redundant, and therefore inadequate to represent exactly the elementary sounds of the languages to which they were applied. The first attempts, then, at writing any language must have ex-

hibited great diversity of spelling. Wherever an extensive literature has sprung up among a people, and language itself been made a study, there a greater or less uniformity of spelling has, by tacit convention or otherwise, become established for a time. Such was the case with Latin in the time of the Cæsars, with High German about the 12th and 13th c., and with English (Anglo-Saxon) in the days of Alfred and for some time afterward. But though language, as depicted to the eye, may be fixed for a time, the spoken tongue, being a living organism, cannot be thus petrified. A written literature may modify, and in some degree retard, but cannot altogether arrest, that incessant change and evolution to which all spoken tongues are subject. The breaking up of the Anglo-Saxon, in its transition into modern English, brought necessarily a period of orthographic chaos. Never was the lawlessness greater than during one of the brightest periods of the literature—namely, the Elizabethan period. Then, and for a long time afterward, all perception of the real powers of the letters seems to have been lost, and caprice ruled. Not only were words spelled differently by different persons, but even among the best-educated classes the same person would spell the same word (even his or her own name) half-a-dozen ways in the same page. Among the classic writers of the Queen Anne period, some degree of uniformity began to establish itself, and this was afterward further confirmed by the publication of Johnson's Dictionary, since which time the alterations have been comparatively small. The modern spelling thus established conformed itself only partially to the changes that the spoken language had undergone. Of the letters that had become silent through the wearing away and collapse of the spoken words, some were omitted and others retained, with little attention to consistency, or to any principle now discernible. Hence, in the English language as now written and spoken, there is in general so imperfect a correspondence between the sound of a word and the sounds of the several letters written to represent it, that the spelling of each individual word has, in a manner, to be learned by itself. By no possible rules can a learner be taught when he sees the groups of letters *n-o-w*, *p-l-o-u-g-h*, *e-n-o-u-g-h*, to make out the sounds or spoken words that these groups actually represent; or, conversely, when he hears the words spoken, to find out what letters they are to be represented by. This fact presents great difficulty to foreigners in the acquisition of English; which, in other respects, is one of the simplest and most easily learned languages in the world. The O. of English is to be acquired only by observation and practice. There are no *rules* in the proper sense of the word; the only effective assistance that can be given in this matter is to bring together, under some kind of classification, the words most frequently misspelled. See PHONETIC WRITING.

ORTHOMETRY, n. *ŏr-thŏm'ĕ-trĭ* [prefix *ortho-;* Gr. *metron,* a measure]: the art of composing or constructing verses correctly; correct versification.

ORTHOPÆDICS, n. *ŏr'thō-pē'dĭkz* [Gr. *orthos,* straight; *paideia,* the rearing of children]: the prevention and cure of deformities of the human body, especially in children.

ORTHOPÆDIST, n. *ŏr-thŏp'ĕ-dĭst* [Gr. *orthos,* straight; *paideia,* the rearing of children]: one who cures or remedies deformities.

ORTHOPHOSPHORIC, a. *ŏr'thō-fŏs-fŏr'ĭk* [Gr. *orthos,* straight, correct, and Eng. *phosphorus*]: applied to common phosphoric acid, which contains three molecules of water.

ORTHOPNŒA, n. *ŏr'thŏp-nē'ă* [Gr. *orthos,* straight; *pnĕō,* I breathe or pant]: a diseased state in which the difficulty of breathing is increased by stooping, or on lying down.

ORTHOPTERA, n. plu. *ŏr-thŏp'tėr-ă* [Gr. *orthos,* straight; *ptera,* wings]: order of insects which have their two outer wings disposed in straight folds when at rest, as the grasshopper and house-cricket; also ORTHOP'TERS, *-tėrz,* and ORTHOP'TERANS, n. plu. *-ănz.* ORTHOP'TEROUS, a. *-ŭs,* of or pertaining to the orthoptera; folding the wings straight.—The *Orthoptera* form order of mandibulate insects, in many respects resembling the *Coleoptera* (q.v.), but having the wing-covers softer and generally leathery and flexible. The wing-covers also often overlap on the back when at rest, or meet at an angle like the roof of a house. The wings are broader than the wing-covers, and fold in a fan-like manner. A few species are wingless. The body is generally elongated. The antennæ are almost always filiform and many-jointed. The eyes are usually very large, and there are also in most species two or three stemmatic eyes. The mouth much resembles that of the Coleoptera, but the maxillæ are terminated by a horny denticulated piece, and covered by a *galea;* and the interior of the mouth exhibits a distinct fleshy piece, which some regard as a kind of tongue. The Orthoptera undergo only a semi-metamorphosis, the larva and pupa much resembling the perfect insect, except in the lack of wings; which, however, begin to be developed in the pupa. The Earwig family differs so much from other Orthoptera as to have been constituted by some entomologists into a distinct order. (See EARWIG.) The Orthoptera are divided into two sections, *Cursoria* and *Saltatoria;* the first with legs adapted for running, as the Mantis family, Spectre Insects, Walking Sticks, Leaf Insects, etc.; the second having the hinder legs very large and strong, generally adapted for leaping, as Grasshoppers, Locusts, etc.

ORTHOSPERMÆ, n. plu. *ŏr'thō-spėr'mē* [Gr. *orthos,* straight; *sperma,* seed]: in *bot.,* seeds which have the albumen flat on the inner face, neither involute nor convolute.

ORTHOSTICHIES, n. plu. *ŏr′thō-stĭk′ĭz* [Gr. *orthos*, straight; *stĭchos*, a series, a row]: in *bot.*, applied to the several vertical rows formed by the leaves in a spiral phyllotaxis.

ORTHOTROPAL, a. *ŏr-thŏt′rō-păl*, or ORTHOT′ROPOUS, a. *-rō-pŭs* [Gr. *orthos*, straight; *tropos*, direction—from *trepō*, I turn]: in *bot.*, having the embryo in a seed lying straight toward the hilum or eye, as in the bean—applied to the ovule with foramen opposite to the hilum.

ORTIVE, a. *ŏr′tĭv* [L. *ortus*, arisen]: rising or eastern.

ORTOLAN, n. *ŏr′tō-lăn* [F. *ortolan;* OF. *hortolan*—from It. *ortolano*, a gardener—from mid. L. *hortulānus*, of the garden—from L. *hortus*, a garden], (*Emberiza hortulana*): small bird of s. Europe, much esteemed for the

Ortolan (*Emberiza hortulana*).

delicacy of its flesh—so called because it frequents the hedges of gardens. It is a species of Bunting (q.v.), much resembling the yellow-hammer, and not quite equal to it in size. The adult male has the back reddish brown, wings dusky black and rufous brown; tail dusky black, some of the outer tail-feathers with a patch of white on the broad inner web; chin, throat, and upper part of the breast yellowish green; other under parts reddish buff-color. The plumage of the female is of less vivid hues. The O. occurs in great flocks in s. Europe and n. Africa. Even in s. Europe it is a summer bird of passage; but its migrations extend as far n. as Lapland, though in Britain it is very rare, and of only accidental occurrence. It has no song, but merely a monotonous chirping note. It frequents bushy places, but often makes its nest on the ground in corn-fields, particularly where the soil is sandy. No bird is so highly esteemed by epicures, and vast numbers are used for the table. It is taken chiefly by nets, with the aid of decoy-birds, and after being taken is fattened on millet and oats, in rooms dimly lighted by lamps. Thus treated, it becomes excessively fat, sometimes so as to die of obesity; and attains a weight of three ounces. Great numbers of ortolans, potted and pickled, are exported from Cyprus. The O. resembles its congener the Yellow-hammer, but has a coloring less bright. In French the

name Ortolan is applied also to the Eng. Snow-bunting, the Rice-bird or Bobolink of N. America, noted for its delicious flavor, and to other birds not so nearly allied.

ORTON, *ōr'ton*, Edward: American educator and geologist: b. Deposit, N. Y., 1829, March 9; d. Columbus, Ohio, 1899, Oct. 16. He was graduated from Hamilton College in 1848, and later studied at Andover and at Harvard. In 1856-65 he occupied the chair of natural science at the Albany State Normal School, accepting in the latter year the same chair at Antioch College, Yellow Springs, Ohio, where in 1873 he was elected president. In that year he was called to the presidency of the newly founded Ohio State Agricultural and Mechanical College, which has since become the Ohio State University. His university work was of great value, as he was a natural teacher and organizer in addition to his scholastic attainments. He was assistant on the geological survey of Ohio in 1869-75, and in 1881 was appointed State geologist, which position he filled until his death, and he frequently served on United States geological surveys. He resigned his presidency of the college in 1881, but continued to fill the chair of geology during his life. Among his works are: *Economic Geology of Ohio* (1883-8); *Petroleum and Inflammable Gas* (1887); etc.

ORTON, James: American Congregational clergyman, naturalist, and traveler: b. Seneca Falls, N. Y., 1830, April 21; d. on Lake Titicaca, Peru, 1877, Sept. 25. He was graduated from Williams College in 1855, pursued theological studies at Andover and entered the ministry in 1860. He was a professor of natural science in Rochester University in 1866 and the next year conducted an exploring expedition across South America. He was professor of natural history in Vassar College 1869-73, and at the time of his death was attached to an exploring expedition in Peru. His works include: *The Andes and the Amazon* (1870); *Underground Treasures* (1872); *Liberal Education of Women* (1873); *Comparative Zoology* (1875).

ORTONA, *ōr-tō'nâ:* town of s. Italy, on the Adriatic, in the province of Chieti, 14 m. e. of the town of Chieti, 8 m. n. of Lanciano. It gives title to a bishop, and contains a cathedral and other religious edifices. Its port has ceased to exist, and vessels must now anchor about a mile from the town in unsheltered roads, where, however, the water is deep and the bottom good. Wine is extensively grown, and has a local reputation as the best in this part of Italy. Pop. about 7,000.

ORTS, n. plu. See Ort.

ORTYG'IA (island). See Delos.

ORTYG'IA (city). See Ephesus.

OR'TYX. See Virginian Quail.

ORURO, *ō-rō'rō:* Bolivia, a department lying in the western part, bounded on the west by Chile, on the south

by the department of Potosi, and on the north by the department of La Paz; area, 21,350 square miles. The Andes Mountains follow the western boundary, and the Cordillera Real the eastern; the department lies in the Titicaca basin. The surface is mostly an elevated plateau, rarely sinking below the level of 12,000 feet; the salt lake of Allugas is situated in the eastern part. There are numerous marshes and saline plains, the soil in general is unfitted for agriculture, and the climate is cold. There is considerable mineral wealth, particularly in tin, silver, and copper, and mining is the chief and most profitable industry; cattle are also raised in some sections. Pop. 130,000, of which a considerable portion are Indians.

ORURO: Bolivia, city, capital of the department of Oruro; within four miles to the east of the Desaguadero river; 125 miles southeast of La Paz. It is on a plain over 12,000 feet above sea-level, about 10 miles north of Lake Allugas. It was founded in 1590, and during the 17th century was very prosperous, owing to the mines in the vicinity, having at that time over 70,000 inhabitants. Later the mines were abandoned, the population declined rapidly, and a portion of the city fell into ruins. During the last decade of the 19th century, a railroad connecting it with Antofagasta, Chile, has been the means of reviving its prosperity to a certain extent. Tin is mined in the vicinity, and considerable quantities of tin, as well as copper and silver are exported. Pop. (estimated) 15,000.

ORUS, n. *ō'rŭs*, or HORUS, n. *hō'rŭs:* an Egyptian god, son of Isis and Osiris, frequently appearing in Egyptian paintings sitting on the lap of Isis.

ORVIETO, *ōr-vē-ā'tō:* Italy, a city and episcopal see in the province of Peruggia, Umbria, 78 miles by rail northwest of Rome. It is built on an isolated tufa rock, 1,327 feet above sea level, and 765 feet above the junction of the Paglia and Chiana, is surrounded by mediæval walls, and is reached from the railroad depot by a funicular or inclined railway. The cruciform cathedral (1290-1580), one of the most beautiful and richly adorned specimens of Italian Gothic, is built of black and white marble, and measures 295 feet by 109. The façade is unsurpassed in richness of material, and in the beauty of its mosaics, sculptures, and elaborate ornamentation. The interior also is magnificently decorated with sculptures and with paintings by Luca-Signorelli, Fra Angelico, etc. Two other churches of the 11th century, the bishop's palace, the Jesuit College, St. Patrick's Well (1527-1540), with its 250 steps, and the palaces Petrungeli and Gualtieri deserve special notice, the former for its fine collection of paintings, and the latter for its cartoons by Domenichino, Annibale Caracci, and other eminent masters. Orvieto, called in the 7th century A.D. Urbs Vetus—of which its present name is a corruption—is supposed to occupy the site of the Etruscan

Volsinii. It was created an episcopal see in 509 A.D., and in the Middle Ages it gave shelter to 32 popes; the papal palace converted into a municipal museum in 1898, has numerous interesting local antiquities, including the contents of an Etruscan necropolis discovered on the east side of the town in 1874. Pop. (1901) with suburbs, 18,543.

ORYCTEROP'IDÆ. See AARD-VARK.

ORYCTOLOGY, n. *ŏr'ĭk-tŏl'ŏ-jĭ* [Gr. *oruktos*, dug up; *logos*, speech]: the study of objects dug out of the earth, as antiquities, skeletons, and fossils.

ORYX, n. *ō'rĭks:* variety of s. African antelope, having the mane and tail of the horse, the head and coloring of the ass, and the legs and feet of the antelope, with long horns tapering backward. The name Oryx was given by the ancients to a species of antelope, native of n. Africa, often represented on the monuments of Egypt; and as these representations are almost always in profile, it is generally made to appear as having only one horn, thus probably contributing to the fable of the unicorn: indeed, all the older figures of the unicorn have considerable resemblance to this kind of antelope. The name *Antilope oryx* was given by Pallas to the Gems-bok (q.v.), an antelope certainly much resembling the oryx, but found only in s. Africa; and it is now generally believed that the true oryx of the ancients is a species known also as the ALGAZEL (*Antilope Gazella*, or *Oryx bezoartica*), common in n. Africa. Their desert habitat is indicated by the prevalent reddish-white uniform tint of their coats, almost the only distinguishing color-marks being upon the face. These antelopes are now greatly reduced in numbers, and some of the northern species are nearly extinct.

ORY'ZA. See RICE.

OS, n. *ŏs*, or OSAR, n. *ō'zâr:* a Swedish term for the long hillocks or mounds of drift gravel and sand which are so abundantly scattered over Sweden and the islands of the Baltic—called *kaims* in Scotland, and *eskirs* in Ireland.

OSAGE INDIANS, *ō-sāj':* tribe of American Indians belonging to the Dakota family. Marquette found them 1673 on the Missouri river. A portion of the tribe assisted the French in their conflict with the Fox Indians at Detroit 1712. Some of their chiefs visited France 1726; and in the war with the English, for possession of the Mississippi valley, the tribe was allied with the French. About the beginning of the 19th c. there were 2 branches, the Great Osages and the Little Osages, total number about 6,300. They were quarrelsome, dishonest, and indolent. Treaties by which they ceded land to the govt. were made 1808,15,18,22,25, and 39. Another branch of the tribe, the Chanees of the Arkansas, had meanwhile been established. A mission opened by the American Board about 1825 was discontinued 20 years

later. A Jesuit mission was established 1846, at the request of a party which had visited France. Many of the tribe perished by war and disease. In the civil war, the Osages aided the Confederacy. They were removed 1872 to a reservation in the Indian Territory bounded n. by Kansas, e. by 96° w. long., and s. and w. by the Arkansas river. It contains about 2,297 sq. m. By authority of the govt., the Soc. of Friends has established schools. Agriculture is pursued to some extent. Quite a sum is received as interest on money obtained from the sale of their original lands. The tribe numbers about 1,800.

OSAGE' River: rising in Wabaunsee co., Kan., and known in the upper part of its course as Marais des Cygnes. It follows a tortuous line e.s.e. for about 125 m., when it enters Mo. near Fort Scott. It receives many tributaries, drains a fine agricultural country, and is the third river in size in the state. It joins the Missouri river about 10 m. below Jefferson. During 6 months in the year its lower portion is navigable for about 200 miles.

O'SAGE OR'ANGE (*Maclura aurantiaca*) : tree of nat. order *Moraceæ*, native of N. America. It attains a height varying, according to soil and situation, from 20 to 60 ft. It is of the same genus with Fustic (q.v.), and its wood, which is bright yellow, might probably be used for dyeing. The wood is fine-grained and very elastic, and is much used by the N. American Indians for bows. The Osage Orange has been introduced into Britain as a hedge-plant. Its fruit is about the size of a large orange, has a tuberculated surface of golden color, and is filled internally with radiating, somewhat woody fibres, and with a yellow milky juice, the odor of which is generally disliked, so that the fruit, though not unwholesome, is seldom eaten.

OSAKA, *ō-zâ'kâ:* Japan, the second largest city of the empire and commonly called its commercial centre. It is situated at the southeastern extremity of Settsu Province, the exact position being in 34° 41′ N. lat. and 135° 31′ E. long. The city is bounded on the east, north and south by extensive flat fields and on the west by Osaka Bay. In shape it is almost square, of an area of about 20 square miles and containing a population (1906) of 1,117,151. The bay and numerous rivers and canals running through the city afford unlimited facilities for shipping and commerce and the largest river, the Aji Gawa, traverses the heart of the city.

This town has been a place of importance from old times. It is said that the first emperor, Jinmu, coming from the south in order to settle in middle Japan about 660 B.C., landed on the site of Osaka. In 313 A.D., Emperor Nintoku made the city his capital and constructed public roads and opened canals. Later, in 645, the city was again made the capital of the empire. The great Abbot Rennio established his temple at Osaka in 1492, making the city the religious centre of Japan. But the

present prosperity and importance of Osaka can be traced to the selection of the city by Toyotomi Hideyoshi, the greatest personality in Japanese history, as the seat of his government, after he had subjugated the whole country. He built the present Osaka Castle in 1583 and devoted his attention to the general development of the city. Here the feudal lords assembled and commerce made speedy progress. Two battles were subsequently fought at Osaka between the Toyotomi and Tokugawa Families, which resulted in the former's downfall. During the Tokugawa rēgime, the canals and harbor were greatly improved and the city remained the principal commercial town of the empire. After the establishment of the present imperial government at Tokyo, Osaka continued, and still continues, to advance in commercial prosperity.

As in other cities, the municipal law operates in Osaka and the city has a municipal assembly, elected by popular vote. The mayor is elected by the assembly and approved by the government. The city is divided into four *ku* or wards and the police is under the governor of the Osaka Prefecture. According to the latest returns there are 148 public and private elementary schools and kindergartens, and seven middle schools, two of which are for girls. In addition there are a Higher Commercial School, High Technical School, Normal School, Girls' Normal School, and Medical School. The number of hospitals of good standing is 48. The city is the centre of numerous industries, including cotton spinning mills, shipbuilding yards, iron works and sugar refining, and the Imperial Mint is located there. The Castle is now occupied by the headquarters of the 4th Army Division.

Osaka was opened to foreign trade in 1889. In 1906 the amount of exports was 59,910,227 *yen* and that of imports 24,878,715 *yen*, the principal articles for export being cotton yarns, clothing, matches and refined sugar, and those for import being sugar, cotton and rice. The foreign shipping entering the port of Osaka during the same year numbered 758, representing 605,416 tons. Foreign residents in the city number 696, Americans being the largest in number, except Chinese. The harbor works of Osaka, recently completed at the cost of 22,000,000 *yen* are claimed to be the largest and finest of their kind in the Far East.

OSAWATOMIE, *ŏs-a-wŏt'ō-mē:* Kan., city in Miami County near the Osage and Pottawatomie rivers, and on the Missouri Pacific railroad. Its name comes from the two rivers mentioned. It is in a stock-raising and agricultural section, and in a natural gas belt. A few settlers were in this section about 1850, but in 1855 the place was organized by the Emigrant Aid Society as a 'free-State' settlement. John Brown (q.v.) was interested in this settlement, and for a time lived on a farm nearby. On Aug. 30, 1856 the town was attacked by a band of pro-slavery sympathizers; John Brown and his friends made

a vigorous resistance, but were finally overcome. The city is the division headquarters for the Missouri Pacific railroad, and has railroad shops and machine-shops, flour mills, and large stock yards. It is the seat of the State Insane Hospital opened in 1866, which has over 1,000 patients each year. Some of the prominent buildings are the city library, city-hall, the Agnew Opera House, a Masonic temple, the churches, and schools. The charter of 1883, revised in 1890, provides for a mayor and council who appoint or elect the administrative officials. Pop. (1900) 4,191.

OSBECKIA, n. *ŏz-bĕk'ĭ-a* [after Peter Osbeck, a Swedish clergyman and naturalist]: in *bot.*, a genus of *Lasiandridæ*, natives of Asia, Africa, and the adjacent islands. They are mostly herbs, with racemes of purple or violet flowers. The fruit of *O. Principis* is used in Brazil for dyeing black; the leaves of *O. chinensis* are used for poultices.

OS'BON, *ŏz'bĕrn*, Bradley S., American naval officer: b. Rye, N. Y., 1828, Aug. 16. He went to sea at 10, and served in the Chinese navy as coxswain, in the Argentine navy as commander, and was an admiral in the Mexican navy. In the Civil War he served under Du Pont, Worden and Farragut, receiving honorable mention by the latter. As volunteer naval scout in the Spanish-American war he was the first to discover the proximity of Cervera's fleet on Curaçoa, 1898, May 14, for which he received the thanks of the government. He has since served in the Arctic and Antarctic oceans and in 1900 he became flag-officer commanding the United States Veteran Navy with the rank of commodore. He has published: *Osbon's Hand Book U. S. Navy* (1864); *U. S. Veteran Navy List* (1900); *A Sailor of Fortune* (1906); etc.

OSBORN, Henry Fairfield, ll.d., sc.d.: American palæontologist: b. Connecticut, 1857. He was graduated from Princeton University in 1877 and in 1880 was assistant professor of anatomy there. Later he became professor of zoology at Columbia University, which post he still occupies. He is vice-president of the American Museum of Natural History, and since 1900 has been palæontologist of the United States Geological Survey. He has published: *From the Greeks to Darwin* (1894); numerous scientific papers, addresses, etc.

OSBORN, Herbert, m.sc.: American biologist: b. Lafayette, Wis., 1856, March 19. He was educated at Iowa State College and was professor of zoology and entomology there 1880-98. Since July 1898 he has been state entomologist of Iowa, and has filled the chair of zoology and entomology at the Ohio State University. Among his professional writings are: *Pedueuli and Mallophaga of Man and the Lower Animals* (1891); *Insects Affecting Domestic Animals* (1896); *The Hessian Fly in the United States* (1898); *The Genus Scaphoideus* (1900); etc.

OSBORN, Laughton: American poet: b. New York 1809; d. there 1878, Dec. 12. He was graduated from Columbia in 1827, devoted his attention chiefly to literature, but was also an amateur musician and painter of good ability. His verses in French and Italian he wrote with a facility almost equal to that which he displayed in English. A large part of his work appeared anonymously. Of his books, many with impressive titles, but the most of them now little read, may be cited: *Sixty Years of the Life of Jeremy Levis* (1831); *Handbook of Oil-Painting* (1856); *Bianca Capello, a Tragedy* (1868); *The Montanini—The School for Critics—Comedies* (1868); *Ugo da Este—Uberto—The Cid of Seville: Tragedies* (1896): *Melcagros—the New Calvary: Tragedies* (1871); *Marianne* (1873).

OSBORN, Sherard: English author and navigator: b. Madras, India, 1822, April 25; d. London, England, 1875, May 6. He entered the navy in 1837 and was ordered to the East Indies where at 17 he commanded a ship in the blockade of Quedah. In 1849 and in 1852-5 he was in command of one of the ships in the expedition sent in search of Sir John Franklin. He served in the Crimean war; in China, and Japan in 1857-9; and in 1862 commanded a fleet for the suppression of piracy. He superintended the laying of the submarine telegraph between Australia and Great Britain and in 1873 was made rear-admiral. He wrote: *Stray Leaves from an Arctic Journal* (1852); *The Career, Last Voyage, and Fate of Sir John Franklin* (3 vols. 1860); *The Past and Future of British Relations in China;* etc.

OSBORN, Thomas Ogden: American lawyer: b. Jersey, Ohio, 1832; d. Washington, D. C., 1904, March 27. He was graduated from the Ohio State University in 1854, and then studied law. At the outbreak of the Civil War he organized and became colonel of the 39th Illinois Volunteers; commanded four regiments at the capture of Fort Sumter, and rose to the rank of major-general of volunteers. He returned to his practice after the war, was treasurer of Cook County, Ill., and manager of the National Soldiers' Home; he served as member of the commission appointed to settle disputed claims between United States and Mexico, and in 1873-85 was United States minister to Argentina.

OSBORNE, (Samuel) Duffield, A.M.: American novelist: b. Brooklyn, N. Y., 1858, June 20. He was graduated from Columbia in 1879 and from the Columbia Law School in 1881 and practiced law in New York 1881-92. He has published *The Spell of Ashtaroth* (1888); *The Robe of Nessus* (1890); *The Secret of the Crater* (1900); *The Lion's Brood* (1902); *The Angels of Messer Ercole* (1907): etc.

OSBORNE BEDS, or St. Hel'en's Beds: series of strata of the Middle Eocene period, in the Isle of Wight. They have been divided into two groups: 1. St. Helen's Sands, consisting of layers of white, green, and yellow

sands, interstratified with blue, white, and yellowish clays and marls, with maximum thickness of 50 ft.; 2. Nettlestone Grits, composed of yellow limestone and marl, and a shelly freestone, much used for building, having a maximum thickness of 20 ft. The fossils of the Osborne Beds are species of Paludina and Cypris, and the spirally sculptured spore-cases of Chara. The group is of fresh and brackish water origin, and is very variable in mineral character and in thickness.

OSBOURNE, Lloyd: American author: b. San Francisco, Cal., 1868, April 7. He was educated at Edinburgh University, traveled extensively and was at one time United States consul at Samoa. He wrote in collaboration with Robert Louis Stevenson: *The Wrong Box* (1889); *The Ebb Tide* (1894); etc. Among his own works are: *The Renegade; The Queen vs. Billy* (1900); *Love, the Fiddler; The Motormaniacs* (1905); *Wild Justice* (1906); *Three Speeds Forward* (1906); *The Tin Diskers* (1906); *The Adventurer* (1907); etc.

OS'CANS, or Op'icans. See Osci.

OSCAR I., *ŏs'kėr*, Joseph-Francis, King of Sweden and Norway: 1799, July 4—1859, July 8 (reigned 1844-57); b. Paris; only child by the marriage of Charles XIV. (q.v.), formerly Marshal Bernadotte, with Desirée Clary, daughter of a Marseillais merchant and sister of Madame Joseph Bonaparte. After the election of his father as crown-prince of Sweden, Oscar received the title Duke of Sudermania, and was placed under the tutelage of the poet Atterbom, to acquire the Swedish language. In 1818 he entered the Univ. of Upsala. He was remarkably proficient in science, literature, and especially the fine arts: he composed various pieces of music, including an opera, waltzes, marches, etc.; he also wrote several songs and hymns, and published memoirs on Education and Penal Establishments. Thoroughly imbued with the national sentiments, after his admission to a share in the administration he opposed, with becoming filial respect, the pro-Russian policy of his father; and his accession to the throne was hailed with delight by his subjects. His rule was distinguished for liberality and justice; and many liberal measures, such as those for the removal of Jewish disabilities, freedom of manufactures and commerce, and parliamentary reform (the last mentioned being vigorously opposed by the nobility), were laid before the *Riksdag* by his orders. He introduced reforms and liberal measures with much vigor, yet with caution and gentleness, and mostly with success. His foreign policy, independent and anti-Russian, gained the general respect of Europe. 1823, July 19, he married Josephine Beauharnais, granddaughter of Empress Josephine, by whom he had five children, the eldest of whom, on account of his father's failing health, was appointed regent 1857, Sep. 25; and at his death succeeded to the throne as Charles XV. Charles XV. died 1872, Sep. 18; and was succeeded by his brother as Oscar II.

OS'CAR II., King of Sweden and Norway (pen-name OSCAR FREDERICK): born Stockholm, 1829, Jan. 21; d. there 1907, Dec. 8; son of Oscar I. He served in the army, studied at the Univ. of Upsala, and spent considerable time in travel on the continent. He was married 1857, June 6, to Princess Sophia of Nassau; and 1872, Sep. 18, succeeded his brother Charles as king. He was recognized as a talented sovereign, speaking, it is said, at least 10 languages with readiness, being well versed in naval and military history and general literature, and winning laurels as critic and poet. Among his writings are *Some Contributions to the Military History of Sweden 1711-13* (1859-65); *Memories of the Swedish Fleet* (1858), and translations from the German of Goethe's *Tasso* and Herder's *Cid*. He was elected an honorary member of the Berlin Academy, and of the Imperial Society of Naturalists of Moscow. His collected works appeared in 1875-90. They were rendered into German by Jonas (verse 1877, 1888; prose 1891).

OSCEOLA, *ŏs-sē-ō'la* (Seminole, *As-se-ho-lar*): chief of the tribe of Seminole Indians in Fla.: about 1803-1838, Jan.; son of an Eng. trader named Powell and the daughter of a Seminole chief. In 1835 the wife of O., a chief's daughter, was claimed and seized as a slave by the owner of her mother. The outraged husband threatened revenge, and for his threats was imprisoned six days in irons by Gen. Thompson. Lying in wait, a few days afterward he killed the general and four others. This was the beginning of the second Seminole war. Laying an ambush soon afterward, he killed Major Dale and a small detachment of soldiers; and taking to the almost impenetrable Everglades, with two or three hundred followers, he fought for a year with great energy and skill the superior numbers sent against him. He was taken prisoner at last by Gen. Jesup, while holding conference under a flag of truce—an act which has been criticised as treachery, though represented as one of retaliation; and was confined in Fort Moultrie until his death.

O'SCI, or OSCANS (originally OPSCI—rendered, by Mommsen, 'laborers,' from *opus*, a work), in Greek always OPIKOI: an Italian people, who at an early period occupied Campania, and were either closely allied to, or the same race as, the Ausones. Subsequently (about B.C. 423), Samnites from the hilly districts of the n. overran the country, and amalgamated with the inhabitants whom they had subjugated. It is conjectured that the conquerors were few in numbers, as (like the Normans in English history) they adopted in time the language of the conquered; but whether they modified the original Oscan language, and, if so, to what extent, cannot now be ascertained. As it was these Samnitic O. or Campanians who formed that Samnitic people with whom first both the Greeks of lower Italy and the Romans came into contact, the names *Osci* and *Oscan language* were subsequently applied to all the other races

OSCEOLA.

and dialects whose origin was nearly or wholly the same The Oscan language was not substantially different from the Latin, but only a ruder and more primitive form of the same central Italic tongue. The territory where it was spoken comprised the countries of the Samnites, Frentani, northern Apulians, Hirpini, Campani, Lucani, Bruttii, and Mamertini, whose dialects differed only slightly from each other; besides the entire Samnitic races, whence the language is sometimes called Samnitic or Safinic. The races n. of the Silarus were purely Samnitic; those s. of it, and even of the region round the Gulf of Naples, were Græco-Samnitic: the use of the national Samnitic alphabet was confined to the former. By the victories of the Romans over the Samnites, and the conferring of the *civitas* on all the Italians (B.C. 88), an end was put to the official use of the Oscan tongue; nevertheless, in the time of Varro (B.C. 1st c.) it was still used by the people, and as late as the destruction of Herculaneum and Pompeii was spoken by a few individuals. During its most flourishing period, it was something more than a country *patois;* it is even possible that the O. had a literature and art of their own, which may not have been without influence on the early Calabrian poets, Ennius and Pacuvius, and the Campanian Lucilius. At any rate, we certainly know of a poetic creation peculiar to the Campanians, a kind of unwritten, regular, probably improvised farce, with fixed parts and changing situations, transplanted to Rome about B.C. 304, but imitated there not in Oscan, but in Latin. (See ATELLANÆ.) Besides a considerable number of coins with Oscan legends, there are extant inscriptions in the Oscan tongue, among which the most important for linguistic purposes are, 1st, the *Tabula Bantina*, a bronze tablet found in the neighborhood of Bantia (on the borders of Lucania and Apulia), referring to the municipal affairs of that town; 2d, the *Cippus Abellanus*, or Stone of Abella (in Campania); and 3d, a bronze tablet found near Agnone, in n. Samnium. See Mommsen's *Oskische Studien* (Berlin 1845) and *Die Unteritalischen Dialekte* (Leip. 1850); also Friedländer's *Die Oskischen Münzen* (Leip. 1850), Kirchhoff's *Das Stadtrecht von Bantia* (Berl. 1853), and Donaldson's *Varronianus* (104-138).

OSCILLATE, v. *ŏs'sĭl-āt* [L. *oscillatus*, swung—from *oscil'lum*, a swing: It. *oscillare:* F. *osciller*, to swing]: to move backward and forward; to swing. OS'CILLATING, imp.: ADJ. swinging; vibrating. OS'CILLATED, pp. OS'CILLA'TION, n. *-lā'shŭn*, a swinging like a pendulum. OS'CILLA'TORY, a. *-ter-ĭ*, vibrating; swinging. OSCILLATING CURRENT, a dwindling alternating current or discharge. OSCILLATING ENGINE, a marine engine of the direct-acting type in which the cylinders are suspended upon hollow trunnions and oscillate thereon, thus allowing the motion of the piston rods to accommodate itself to that of the crank at all parts of the revolution. It occupies but

little space, and is peculiarly adapted for paddle-wheel steamers. For screw propulsion, it has been entirely supplanted by multiple-expansion engines.

OSCILLOGRAPH: a form of D'Arsonvel galvanometer, having a reflecting mirror, in which the moving parts are so light and the range of movement so small that the rapid variations in alternating and pulsating currents are easily followed by the ray of light reflected from the mirror. By reason of the persistance of vision, the rapidly moving spot of light actually appears to the eye as a complete curve of current or pressure from an alternating current dynamo.

OSCULA, n. plu. *ŏs'kū-lă* [L. *os'cula*, little mouths; *os'culum*, a little mouth, a kiss—from *os*, a mouth]: the name given to the larger pores on the surface of a sponge. Os'CULAR, a. *-lĕr*, pertaining to. Os'CULATE, v. *-lāt* [L. *osculātus*, kissed]: to kiss; to come in contact with, as a curve and a circle: to adhere closely, as caterpillars and other creeping animals. Os'CULATING, imp. OSCULATED, pp. Os'CULA'TION, n. *-lā-shŭn*, a kiss; close contact: in *geom.* (see below). Os'CULANT, a. *-lănt*, that adheres closely. Os'CULA'TORY, a. *lā'tĕr-ĭ*, of or pertaining to kissing; having the same curvature at the point of contact: N. a tablet or board having the picture of Christ or the Virgin, which was first kissed by the priest and then by the people. Os'CULE, n. *-kūl*, a small two-lipped aperture.

OSCULATION: in *geometry:* contact of two curves or surfaces closer than mere tangency. Thus, an infinite number of circles can be drawn in a plane, all of them tangent to a given curve at a given point. Among these circles there is always one which has closer contact than any of the others with the curve. This circle is called the Osculating Circle of the curve at the given point; it not only touches the curve there, but also *crosses* it; it has the same curvature as the curve at the point. (See CURVATURE.) A mere tangency of two curves results when one of them is so moved that two of its intersections with the other are brought to coincide. This is called two point contact. If three intersections are brought to coincide, the contact is said to be three point, or of the third order, etc. Any contact above the second order is commonly called an osculation, though in strictness this name applies only to three point contact. The equation of a straight line $y = mx + b$ contains only two constants, m and b. Hence a straight line can be subjected only to two conditions, e.g., that two of its intersections with a given curve shall fall at a given point. Hence a line can have in general only two point, or ordinary, contact with a curve. The equation of a circle, $x^2 + y^2 + 2\,a\,x + 2\,b\,y + c = 0$ contains three constants, and a circle can therefore generally have only three point contact with a curve. A parabola may have four point contact with a given curve.

OSGOOD, Howard, D.D.: Baptist minister: b. 1831, Jan. 4, Plaquemine parish, La. After studying at Harvard he was ordained to the ministry as a Baptist, though brought up an Episcopalian; was pastor at Flushing, N. Y., and in New York; was called 1868 to be prof. of Hebrew in Crozier Theol. Seminary, Penn.; and 1875 to the same chair in Rochester Theol. Seminary. He was one of the American revisers of The Old Testament.

OSGOOD, Kate Putnam: author: b. Fryeburg, Me., 1841; sister of James Ripley O., publisher. After five years of European sojourn, she returned to the United States 1874. She has written frequently in prose and poetry for the magazines—her best-known production being a poem, *Driving Home the Cows*, in *Harper's Magazine*, 1865, Mar., which had immense popularity.

OS'GOOD, Samuel: 1748, Feb. 14—1813, Aug. 12; b. Andover, Mass. He graduated from Harvard 1770, studied theology, but on account of failing health entered mercantile life. He was a col. in the revolutionary army, was in the Mass. legislature, in congress 1780–84, was appointed judge 1785, was first commissioner of the U. S. treasury 1785–89, and postmaster-gen. 1789–91, resigning in the latter year on account of the removal of the seat of govt. to Philadelphia. He had become a resident of New York, became a member of the N. Y. legislature, was supervisor of the state, and for about 10 years previous to his death was naval officer of the port of New York. Among his books were *A Letter on Episcopacy* and *Theology and Metaphysics*. He d. at New York.

OS'GOOD, Samuel, D.D., LL.D.: 1812, Aug. 30—1880, Apr. 14; b. Charlestown, Mass. He graduated from Harvard College 1832, and from the Unit. Divinity School 3 years later. After editing the *Western Messenger* at Louisville, Ky., two years, he became pastor of a Unit. church at Nashua, N. H., 1837; was settled at Providence 1841, and 1849 became pastor of the Church of the Messiah in New York, which office he held 20 years. He travelled in Europe 1869, left the Unit. and joined the Prot. Episc. denomination 1870, and gave the remainder of his life to literary pursuits. He was a corresponding sec. of the New York Historical Soc. for several years, and was a popular lecturer and magazine-writer. During several years of his pastorate in New York, he was one of the editors of the *Christian Inquirer* (Unit.). Besides translating some important German works, he wrote *Studies in Christian Biography*, *God with Man*, *The Hearth-Stone*, *Student-Life*, *American Leaves*, and other books. He d. at New York.

OSHIMA (big island): Japanese term for the larger of two neighboring islands. It is applied especially to Barneveld's or Vries Island, near the entrance to the Gulf of Yedo, 8 m. long 5 m. wide, on which are several villages, a good harbor, and a volcano about 2,500 ft. high.

OSHKOSH, *ŏsh'kŏsh:* city, cap. of Winnebago co., Wis.; on the Fox river, at its junction with Lake Winnebago, and on the Chicago and Northwestern, the Chicago Milwaukee and St. Paul, the Wisconsin Central, and the Milwaukee Lake Shore and Western railroads; 17 m. from Fond du Lac, about 100 m. by rail from Milwaukee. It has direct water-communication with Lake Michigan on the e. and the Mississippi river on the w. It is built on each side of the Fox river, and extends about 4 m. along the lake-front. The site slopes from the water, thus giving natural drainage. There are 25 churches; many benevolent and fraternal societies; a state normal school, high school, excellent public schools of lower grade, and 11 private schools; a public library; 1 monthly, 1 semi-monthly, 6 weekly, and 2 daily newspapers; 4 national banks (cap. $700,000); surplus, $245,125. There are two opera-houses and 5 hotels. The Northern Wisconsin Insane Asylum, and a hospital under the management of the Alexian Brothers, are located here. There is a line of street railroad; many of the streets are paved, and are lighted with electricity. The stores and residences are largely lighted with gas. There is an efficient fire department. An abundant supply of pure water is obtained from artesian wells, and distributed by the Holly system. The Fox river is crossed by 3 fine iron bridges for wagons and 3 railroad bridges. Among notable public buildings are the court-house, city-hall, Masonic temple, and the U. S. govt. building. The lumber business is of immense proportions, one of the companies engaged therein having the largest plant of the kind in the world. There are more than a dozen large saw-mills, a large number of shingle-mills, several sash and door factories which supply about 10 per cent. of all the goods of these classes made in the United States, numerous planing-mills, 5 carriage factories, several furniture-shops, foundries and machine-shops, 4 chair factories, 2 trunk factories, several pork-packing establishments, 3 soap factories, and the largest match factory in the world. A trading-post was established by the French about 1820, but the first permanent settlement at O. was made by parties from New England 1836. A city charter was secured 1853. The buildings were nearly all burned 1859, and there were very destructive fires 1866, 74, and 75. The suburban portion of the city also suffered severely from a cyclone 1885. Area 9 sq. m.; public debt $116,000; valuation $7,093,837. Pop. (1870) 12,663; (1880) 15,748; (1885) (1890) 22,834; (1900) 28,284.

OSIANDER, *ō-zē-ân'der*, ANDREAS: learned and zealous German reformer: 1498, Dec. 19—1552, Oct. 17; b. Gunzenhausen, near Nürnberg. His father was a blacksmith, called Heiligmann, or according to some, Hosemann, out of which name his son, after the fashion of his time, manufactured the classic-looking Osiander. O. was educated at Ingolstadt and Wittenberg; and after completing his course of study, became a preacher at

Nürnberg, where he was conspicuously active in introducing the Reformation (1522). He ardently advocated the views of Luther in his controversy with the Swiss reformer Zwingli, on the question of the Lord's Supper. He took part in the conference held at Marburg (1529), and was present at the diet of Augsburg (1530). In 1548 he was deprived of his office as preacher at Nürnberg, because he would not agree to the Augsburg Interim; but was immediately afterward invited by Albrecht, Duke of Prussia, to become head of the theological faculty in the newly-established univ. of Königsberg. He was hardly settled here when he became entangled in a theological strife that imbittered his naturally imperious, vehement, and arrogant temper. In a treatise, *De Lege et Evangelio* ('On the Law and the Gospel'), O. asserted that the righteousness by which sinners are justified, is not to be conceived as a mere justificatory or imputative act on the part of God, but as something inward and subjective, as the impartation of a real righteousness, springing in a mystical way from the union of Christ with man. The most notable of his opponents was Martin Chemnitz (q.v.). A seemingly amicable arrangement between the disputants was brought about by Duke Albrecht 1551; but the strife was soon recommenced, by O. publishing some new writings in which he attacked Melanchthon; nor did his death in the following year put a stop to the war of words. It was continued by his followers, called *Osiandrists*, who were finally extinguished by the *Corpus Doctrinæ Prutenicum* (1567), which caused their banishment from all parts of Prussia. See Wilken, *Andr. Osiander's Leben, Lehre und Schriften* (Strals. 1844).

OSIER, n. *ō'zhėr* [F. *osier*, a willow: prov. F. *aoza*, to form, to fashion; *aozil*, a willow: Gr. *oisos*, a species of willow]: popular name of those species of Willow (q.v.), used chiefly for basket-making and other wicker-work. OSIERED, a. *ō'zhėrd*, covered with osiers. OSIER-BED, or OSIER-HOLT [AS. *holt*, a grove]: piece of land, especially an islet, on which willows are cultivated for basket-work.—*Osiers* are of low bushy growth, few ever becoming trees; their branches long and slender; and they are the more valuable in proportion to the length, slenderness, suppleness, and toughness of their branches. Their leaves are long and narrow, lanceolate, or nearly so, obscurely notched on the margin, almost always smooth on the upper side, but generally white and downy beneath. The COMMON O. (*Salix viminalis*), a common native of wet alluvial grounds, is one of those which sometimes become trees, though when cultivated for basket-making, it is not permitted to do so. It has two distinct stamens in the flowers of the male catkins; and the stigmas of the female catkins are long and slender. It is often planted to prevent the banks of rivers from being washed away. Its branches are used for making hoops and coarse baskets. There are several varieties in cultivation, not easily distinguished except

by a very practiced eye, but much more useful than the original or wild kind, which is apt to break, and therefore of little value. More suitable for finer basket-making are *Salix Forbyana*, sometimes called the FINE BASKET O., and *S. rubra*, known in some places as the GREEN-LEAVED O. or ORNARD; *S. triandra*, triandrous species, known to English osier-cultivators and basket-makers as the SPANIARD ROD; while *S. vitellina*, pentandrous species, sometimes becoming a tree, is the GOLDEN O. or Golden Willow, remarkable for the bright yellow of its branches, as well as for their pliancy and toughness. There are other valuable species; but the osiers chiefly cultivated are of the above species or those very nearly allied to them.

Osiers are very extensively cultivated in Holland, Belgium, and France, on alluvial soils, especially near the mouths of rivers; and from these countries great quantities of 'rods' are exported. Osiers grow particularly well on grounds flooded by the tide. Much depends on the closeness of planting of O. grounds; as when space is too abundant, the shoots of many of the kinds do not grow up so long, slender, and unbranched as is desirable. The French cultivators, when they wish osiers for the finest kinds of basket-work, cut branches into little bits, with a bud or eye in each, and plant these close together, so as to obtain weak but fine shoots; but generally cuttings 15 or 16 inches in length are used, and of moderately thick branches; and these are placed in rows, 18 inches to 2 ft. apart, and at distances of 15 to 18 inches in the row. O. plantations in light soils continue productive 15 or 20 years, and much longer in rich alluvial soils. Osiers thrive in rich soils, but not in clays. No cultivation is required after planting; but the shoots are cut once a year, at any time between the fall of the leaf and the rising of the sap in spring. After cutting, they are sorted; and those intended for brown baskets are carefully dried and stacked, care being taken that they do not *heat*, to which they are liable, like hay, and by which they would be rotted and rendered worthless. The stacks must be carefully protected from rain. The osiers intended for white baskets cannot at once be peeled; but after being sorted, they are placed upright in wide shallow trenches, in which there is water to the depth of about four inches, or in rivulets, being kept secure in their upright position by posts and rails; and thus they remain till they begin to bud and blossom in spring, which they do as if they remained on the parent plant, sending forth small roots at the same time into the water. They are then, in ordinary seasons, easily peeled by drawing them through an instrument called a *break;* but in cold springs it is sometimes necessary to lay them for a while under a quantity of litter. After being peeled, they are stacked, preparatory to sale.

OSIRIS.

OSIRIS, n. *ŏs-ī′rĭs*, also Asiris, or Hysiris (Many-eyed): one of the principal Egyptian deities, husband of Isis, and father of Orus; worshipped throughout Egypt under the form of a bull, or of a human body with a bull's head. Osirian, a. *ŏs-ĭr′ĭ-ăn*, of or pertaining to Osiris. Osir′ianism, n. *-ĭzm*, the rites and doctrines connected with the worship of Osiris.—*Osiris* appears in the hieroglyphic texts as early as the 4th dynasty, and is expressed by a throne and eye; at a later period, that of the 19th dyuasty, a palanquin is substituted for a throne; and under the Romans, the pupil of the eye for the eye itself. O. does not indeed appear to have been universally honored till the time of the 11th and 12th dynasties, or about B.C. 1800, when Abydos, reputed his burial-place, rose into importance. In the monuments of this age he is called great god, eternal ruler, dwelling in the west, and lord of Abut or Abydos. Even at the most remote period, individuals after death were supposed to become an Osiris; and all the prayers and ceremonies performed or addressed to them were in this character, referring to their future life and resurrection. At the time of the 18th dynasty, this title of O. was prefixed to their names, and continued to be so till the time of the Romans and fall of paganism.

In the Ritual, and other inscriptions, O. is said to be son of Seb or Saturn, and born of Nu or Rhea; to be father of Horus by Isis, of Anubis, and of the four genii of the dead. Many mystic notions were connected with O.; he was sometimes thought to be son of Ra the Sun, or of Atum the setting Sun, and the Bennu or Phœnix; also to be uncreate, or self-engendered, and he is identified in some instances with the Sun or the Creator, and the Pluto or Judge of Hades. O. was born on the first of the Epagomenæ, or five additional days of the year. When born, Chronos or Saturn is said to have given him in charge to Pamyles; having become king of Egypt, he is stated to have civilized the Egyptians, and especially to have taught them agriculture, the culture of the vine, and the art of making beer; he afterward travelled over the earth, and conquered the people everywhere by his persuasion. During his absence, his kingdom was confided to Isis, who guarded it strictly; and Set or Typhon, brother of O. (born on the 3d of the Epagomenæ) was unable to revolt against him. Typhon had, however, persuaded 72 other persons, and Aso, queen of Ethiopia, to join him in a conspiracy; and having taken the measure of O., he had a chest made of the same dimensions, richly ornamented and carved, and produced it at a banquet, where he promised to give it to whomsoever it should fit; and when all had lain down and tried it, and it suited none, O. at last laid himself down in it, and was immediately covered over by the conspirators, who placed the lid upon it, and fastened it with nails and molten lead. The chest was then hurled into the Nile, and floated down the Tanaitic mouth into the sea. This happened on the 17th of the

month Athyr, in the 28th year of the reign or age of Osiris. Khem or Pan, and his attendant deities, discovered the loss of the god; Isis immediately cut off a lock of hair and went into mourning, and proceeded in search of Anubis, child of her sister Nephthys by O.; and having found him, brought him up. The chest having floated to Byblos, had lodged in a tamarisk, and became inclosed in the tree, which was cut down by the king, and the trunk, containing the chest and the body of the god, converted into a pillar to support the roof of the palace. The goddess proceeded to Byblos, and ingratiated herself with the queen's women by plaiting their hair and imparting to it an ambrosial smell, so that the monarch, whose name was Melcarthus, and his wife, Saosis or Nemanoun, invited her to court to take care of the royal child. She endeavored to confer immortality on him by placing him on a fire, and changing herself into a swallow, flew round the pillar and bemoaned her fate. The queen became alarmed at the danger of her child; Isis revealed herself, and asked for the pillar of tamarisk wood, which was given her. She then cut it open, and took out the chest, making great lamentations, and subsequently sailed for Egypt, with the eldest of the king's sons. The goddess, intending to visit Horus her son at Buto, deposited the chest in an unfrequented spot; but Typhon discovered it by the light of the moon, tore it into 14 pieces, and distributed each to a nome or district. Isis recovered all by passing the marshes in a boat of papyrus; all except the phallus, which had been eaten by the Lepidotus, the Phagrus, and Oxyrhynchus fish. Subsequently, a battle took place between Horus and Typhon or Set, which lasted three days, and ended by Typhon having fetters placed upon him. Isis, however, liberated Typhon, which so enraged Horus that he tore off her diadem, but Teti or Thoth placed on her the head of a cow instead. Typhon finally accused Horus of illegitimacy; but the question was decided between them by Teti or Thoth and the gods. From O., after his death, and Isis sprung Harpocrates: see HARPOCRATES. O. seems to have been finally revived, and to have become the judge of the Karneter or Hades, presiding at the final judgment of souls in the Hall of the two Truths, with the 42 demons who presided over the capital sins, and awarding to the soul its final destiny. Thoth or Hermes recorded the judgment, and justified the deceased against his accusers, as he had done for Osiris.

Considerable diversity of opinion existed among the ancients themselves as to the meaning of the myth of Osiris. He represented, according to Plutarch, the inundation of the Nile; Isis, the irrigated land; Horus, the vapors; Buto, the marshes; Nephthys, the edge of the desert; Anubis, the barren soil; Typhon, was the sea; the conspirators were the drought; the chest was the river's banks. The Tanaitic branch was the one which overflowed unprofitably; the 28 years, the number of cubits which the Nile rose at Elephantine; Harpocrates,

the first shootings of the corn. Such are the naturalistic interpretations of Plutarch; but there appears in the myth the dualistic principle of good and evil, represented by Osiris and Set or Typhon, or paralleled by the contest of Ra or the Son, and Apophis or Darkness. The difficulty of interpretation is increased from the form of Osiris having become blended or identified with that of other deities, especially Ptah-Socharis, the pigmy of Memphis, and the bull Hapis or Apis, the avatar of Ptah. Osiris was the head of a tetrad of deities, whose local worship was at Abydos, but who were the last repetition of the gods of the other nomes of Egypt, and who had assumed an heroic or mortal type. In form, Osiris is always represented swathed or mummied in allusion to his embalmment; a net-work, suggestive of the net by which his remains were fished out of the Nile, covers this dress; on his head he wears the cap *atf*, having at each side the feather of truth, of which he was the lord. This is placed on the horns of a goat. His hands hold the crook and whip, to indicate his governing and directing power; and his feet are based on the cubit of truth; a panther's skin on a pole is often placed before him, and festoons of grapes hang over his shrine, connecting him with Dionysos. As 'the good being,' or Onnophris the meek hearted, the celestial or king of heaven, he wears the white or upper crown. Another and rarer type of him represents him as the *Tat*, or emblem of stability, wearing the crown of the two Truths upon his head. His worship, at a later time, was extended over Asia Minor, Greece, and Rome, and at an early age had penetrated into Phœnicia, traces of it being found on the coins of Malta and other places. It was introduced with the Isiac worship into Rome, and had votaries under the Roman empire. But the attacks of the philosophers, and the rise of Christianity, overthrew these exotic deities.

OSKALOOSA, *ŏs-ka-lô'sa:* Iowa, city, county-seat of Mahaska County; on the Chicago, Burlington & Q., the Iowa Central, and the Chicago, Rock Island & P. R.R.'s; about 65 miles southeast of Des Moines. It was settled in 1843 and incorporated in 1853. It is the commercial centre of a fertile agricultural and stock-raising region. In the vicinity are large deposits of coal, lime-stone and fire-clay. The chief industries are flour milling, manufacturing vitrified brick, wagons, iron and brass goods, heaters, and woolen goods. It has a large meat-packing plant, and coal and brick yards. The principal buildings are the postoffice, the church, school and library buildings. The educational institutions are the Penn College, opened in 1873 under the auspices of the Friends, the Oskaloosa College, under the auspices of the Disciples of Christ, a business school, and a public library. The Society of Friends of the State of Iowa hold their annual meeting here. Pop. (1900) 9,212.

OSLER, William, MD., LL.D., D.SC., D.C.L.: Canadian physician, educator, and author: b. at Bondhead, Tecumseh, Ont., 1849, July 12. He studied at Trinity Col-

lege, Toronto, at the Toronto School of Medicine, and at McGill University, where he graduated M.D. in 1872. Proceeding to Europe he continued his studies at University College, London, in Berlin and in Vienna, and returning to Canada in 1874, received the appointment of professor of physiology and pathology in McGill University, which he retained until appointed to the chair of clinical medicine in the University of Pennsylvania in 1884. He was chosen as the Galstonian lecturer in the Royal College of Physicians, London, Eng., in 1885; and as the Cartwright lecturer in the College of Physicians and Surgeons, New York, in 1886. He is a fellow of the Royal Society of England; and a member of the London Royal College of Physicians. In 1889 he was appointed professor of the principles and practice of medicine in Johns Hopkins University and chief physician to the Johns Hopkins Hospital, Baltimore, positions which he resigned in 1904 upon his appointment as regius professor of medicine in the University of Oxford, Eng. A writer of international repute in various American and European medical journals, he is also the author of *Clinical Notes on Smallpox* (1876); *Histology Notes* (1882); *Cerebral Palsies of Children* (1889); *Principles and Practice of Medicine* (1892), a standard modern work which had reached a 6th edition in 1906; *Chorea and Choreiform Affections* (1894); *Lectures on Abdominal Tumors* (1895); *Angina Pectoris and Allied States* (1897); *Cancer of the Stomach* (1900); *Science and Immortality* (Ingersoll lecture at Harvard, 1904); *Æquanimitas and Other Addresses* (2d ed. 1900); *Counsels and Ideals* (1906); etc.

OSMAN DIGNA, *ŏs-mân' dĭg'na* ('Osman the Bearded'), Sudanese chief: b. 1836. He was a slave-trader; suffered financial losses because of English interference with his ships; raised an army of 20,000 men in 1881-2 to assist Arabi Pasha against the English; as chief of the sheiks of Eastern Sudan contributed largely to Gordon's capture and death by blocking the approach to Khartum, through Suakim; was the hero of a long and costly siege at Tokar in 1887-8; joined the Mahdi in the rising of 1899; and in 1900 was captured and imprisoned at Rosetta.

OSMAN NURI PASHA, *nô'rē păsh'â*, called GHAZI, 'the Victorious,' Turkish general: b. Amasia, Asia Minor, 1837; d. Constantinople 1900, April 5. He saw service against the Druses in 1860 and in Crete in 1867, fought in the Yemen campaign of 1871, became marshal in 1876, and in the war with Russia, after bold and brilliant manœuvers, occupied Plevna, which he was forced to surrender 1877, Dec. 10, in spite of his heroic attempt to break through the forces of his besiegers. He was returned to Turkey after the treaty of San Stefano, entrusted with the reorganization of the Turkish army, and was minister of war 1880-5, and marshal of the palace after 1880.

OSMAN′: see OTHMAN.

OSMAZOME, n. *ŏz′mă-zōm* [Gr. *osmē*, odor; *zōmos*, broth, sauce: F. *osmazome*]: name given by Thenard to the spirit-extract of flesh, on which, as he supposed, its agreeable taste, when cooked, depended. The term is now abandoned by chemists.

OSMEROIDES, n. plu. *ŏz′mĕr-oydz* [L. *osmĕrus*, a smelt; Gr. *eidos*, resemblance]: in *geol.*, a genus of fossil fishes found in the Chalk of England—so named from their resemblance to the smelt, small fish of the salmon family.

OSMIC ACID: see under OSMIUM.

OSMIRIDIUM, n. *ŏz′mĭr-ĭd′ĭ-ŭm:* a native compound of *osmium* and *iridium.*

OSMIUM, n. *ŏz′mĭ-ŭm* [Gr. *osmē*, smell, named from the strong irritating odor given out by its tetroxide when at a temperature about 220° Fahr.]: elementary body; one of the noble metals found associated with platinum in the form of an alloy with iridium. OS′MIC ACID, *-mĭk*, or OS′MIOUS ACID, *-mĭ-ŭs*, acids from osmium.—Osmium (symb. Os; old equiv. 100; new eq. 200; spec. grav. 10). It may be obtained in the metallic condition by several processes which yield it either in thin, dark-gray glistening scales, or as a dense iron-black mass. It is the least fusible of all metals; the oxyhydrogen jet volatilizing it, but not fusing it.

Five oxides of O. are known—viz., the *protoxide* (OsO), of dark-green color, and forming green salts when dissolved in acids; the *sesquioxide* (Os_2O_3), a black insoluble powder; the *binoxide* (OsO_2), which is also insoluble and black; the *teroxide* (OsO_3), which possesses the characters of a weak acid radical, but has not been isolated; and *osmic tetroxide* often called *osmic acid* (OsO_4), in colorless, glistening, acicular crystals, freely soluble in water, and very volatile. It produces a permanent black stain upon the skin, and gives a blue precipitate with tincture of galls. O. forms also three chlorides, $OsCl_2$, Os_2Cl_6, and $OsCl_4$. This metal was discovered by Tennant 1803.

OSMOSE, n. *ŏz′mōz*, or OSMOSIS, n. *ŏz-mō′zĭs* [Gr. *ōsmos*, a pushing impulse—from *ōthein*, to push]: the tendency of fluids of different kinds and densities to become diffused through a separating membrane when placed in contact with it; the action produced by this tendency. OSMOTIC, a. *ŏz-mŏt′ĭk*, pertaining to or having the property of osmose.—*Osmose* denotes the tendency to the diffusion above noted, and the action of that tendency; and *Dialysis* denotes the process of analysis of liquid by such diffusion. For the earlier discoveries of Dutrochet and Graham, see DIFFUSION. The subject has been much extended recently, principally by the investigations of Graham; and as the phenomena are exceedingly interesting and important, in their relations to secretion, absorption, and various other organic processes, some of these later facts are here given.

OSMOSE.

When two different liquids are separated by a bladder or other membrane, or a piece of calico coated with coagulated albumen, there is always a more or less rapid transference of the two liquids in opposite directions through the diaphragm. In certain cases, the explanation given under DIFFUSION (above referred to) is complete, but in others it appears insufficient. Graham has made an extensive series of experiments upon O., where distilled water was on one side of the diaphragm, and various liquids and solutions on the other, and has arrived at many general results, of which the following are the more important. The O. is considered as *positive* when more of the water than of the other liquid passes through the diaphragm. Such substances as gum, gelatine, etc., produce scarcely any effect. Solutions of neutral salts, e.g., common salt, Epsom salts, etc., follow the ordinary law of diffusion, as if no diaphragm had been interposed. Acid salts in solution, and dilute acids, pass rapidly into the water—or the O. is *negative;* while alkaline solutions give, in general, a strong *positive* effect.

In all the cases in which an osmotic action occurs which cannot be explained by capillary forces, there is chemical action on the diaphragm; and conversely, such O. cannot be produced if the material of the diaphragm be not acted on by the liquids in contact with it.

But the most remarkable results of Graham's later investigations are those relating to Dialysis—i.e., to the separation of the constituents of mixtures, and even the decomposition of chemical compounds, by O. The results of his earlier investigations, above given, show remarkable difference between two classes of bodies; gum, gelatine, etc., which forms viscous solutions, on the one hand; and salts, acids, and alkalies, on the other. The first class he has called *Colloids;* the second, *Crystalloids*. The former are extremely sluggish, the latter comparatively rapid in their action. Thus, of common salt and albumen, under precisely similar circumstances, there pass through the diaphragm in a given time quantities which are as 25 to 1 by weight. Hence, if a solution containing both classes of substances be opposed to pure water, the crystalloids will pass rapidly through the diaphragm, and the colloids slowly. This process promises to be of very great value in medical jurisprudence, as, without introducing any new substance (except the diaphragm and distilled water), we have the means of separating from the generally colloidal contents of animal viscera such poisonous crystalloids as white arsenic, vegetable alkaloids, etc., which by the old methods was usually difficult and uncertain. These methods are still in their infancy. One economical application has been shown practicable. When a bladder is filled with the brine of salt beef, and suspended in fresh water, the salt after a time nearly all disappears, and there remains in the bladder a rich extract of meat fit for making soup.—For a brief notice of the speculations which Graham's researches have led him to form as to the nature of *Matter*, see MATTER.

OSMUND, n. *ŏz′mŭnd* [*Osmunda*, a name of Thor, a Tentonic deity]: fern-plant of the genus OSMUN′DA, and order OSMUNDACEÆ, *ŏs′mŭn-dā′sē-ē*, the flowering fern; the royal fern.

OSMUNDA, *ŏz-mŭn′da:* a genus of ferns, distinguished by spore-cases in branched, stalked masses. The OSMUND-ROYAL, ROYAL or FLOWERING FERN (*O. regalis*), noblest and most striking of British ferns, frequent in moist districts of Scotland and Ireland, growing in boggy places and the wet margins of woods, is found in many parts of Europe and in N. America. It has bipinnate fronds, and panicled spore-cases upon altered fronds, which appear as stalks distinct from the fronds, and assimilate the general appearance to that of a phanerogamous plant. It sometimes rises to 11 ft. in height. It possesses tonic and styptic properties, and its root-stocks were formerly employed in scrofula. The root-stocks abound in a mucilaginous substance, which, being

Royal Fern (*Osmunda regalis*):
a, pinnate of a barren frond; *b*, branchlet of fertile frond; *c*, spore-case; *d*, the same, showing how it opens by two valves.

extracted by boiling them in water, is used in n. Europe instead of starch.

OSNABRÜCK: chief town in the territory of O., in the midst of the extended and fruitful valley of the Hase, 80 m. w. s. w. of Hanover by railway. It still ranks as one of the principal commercial cities of Hanover, though it has not the pre-eminence which it had before the establishment of the Zollverein. O. has thriving manufactories of cigars and tobacco, paper-hangings, and cotton and woolen goods, and extensive works for preparation of mineral dyes and cement, besides iron, machinery, and carriage manufactories. According to the opinion of antiquarians, O. stands on the site of the anc. Wittekindsburg, which was raised to a bishopric 783 by Charlemagne, some relics of whom, together with the pretended bones of the martyrs Crispinus and Crispinianus, are preserved in the cathedral—a fine specimen of the Byzantine architecture of the 12th c. The Church of St. Mary, a noble Gothic building, was erected by the burghers of O. in the 14th c. during their contentions with their haughty ecclesiastical rulers, and contains the grave of Julius Möser (1720–94), patriot and philanthropist, in whose honor a statue was placed in the square of the cathedral 1836. The signing of the peace of Westphalia 1648, in an apartment of the town-hall, is commemorated by the preservation of the portraits of all the ambassadors who took part in the treaty. It was decreed in this treaty that the ancient bishopric of O. should thenceforth be occupied alternately by a Roman Cath. prelate and a Prot. secular prince of the House of Brunswick-Luneburg; and after having been last held by Frederick, Duke of York, the district of O. was ceded to Hanover 1803, and the chapter finally dissolved.—Pop. of town (1890) 39,929; (1900) 51,573.

OSNABRUCK, *ŏs'nâ-brük*, or OSNABURG, *ŏs'nâ-bûrch:* territory occupying the w. portion of the Prussian province of Hanover, comprising the principality of O., the countships of Lingen and of Bentheim, and the duchy of Arensberg-Meppen and the lordship of Papenburg; 2,408 sq. m. Pop. (1890) 299,478.

OSNABURG, n. *ŏz'nă-bėrg:* a coarse linen, so called from its being originally imported from *Osnaburg*, in Germany.

OSPREY, n., or OSPRAY, n., *ŏs'prā* [a corruption of *ossifrage*—from L. *ossif'răgus*, the bone-breaker, the sea-eagle—from *os*, a bone—gen. *ossis; frango*, I break], (*Pandion*): genus of *Falconidæ*, of which only one species is known (*P. haliaëtus*), called also the FISHING HAWK or FISHING EAGLE, and the BALD BUZZARD. It is singular among the *Falconidæ* in preying *exclusively* on fish; and to this its whole structure and habits are adapted. Its whole length is about 22 inches: it is of dark-brown color, variegated with black, gray, and white. The under parts are white, except a light-brown band across the chest. The bill is short, strong, rounded, and broad. The tail is rather long, the wings are very long, extending beyond the tail; the under surface of the toes remark-

ably rough, covered with small pointed scales, suited for securing of slippery prey; the claws not grooved beneath, as in most of the *Falconidæ*. The feathers are destitute of the supplementary plume, which is considerably developed in most of the *Falconidæ*. The intestine differs from that of the other *Falconidæ* in being very slender and of great length. The O. is seen chiefly near the sea, lakes, and large rivers. No bird is more widely diffused; it is found in all quarters of the world, in both very

Osprey (*Pandion haliaëtus*).

warm and very cold climates. It is everywhere a bird of passage, retiring from high n. latitudes on the appearance of frost. In some places in Scotland, it still breeds year after year, on the highest summit of a ruined building, or the top of an old tree. It is very plentiful in parts of N. America; and its return in the beginning of spring is hailed by fishermen, as indicative of the appearance of fish. The nest is a huge structure of rotten sticks, in the outer interstices of which smaller birds sometimes make their nests; for the O. never preys on birds, and is not dreaded by them. It is, indeed, pacific and timorous, and readily abandons its prey to the White-headed Eagle (or Erne, q.v.). In the days of falconry, the O., being very docile, was sometimes trained and used for catching fish.

OSSA, *ŏs'sâ:* ancient name of a mountain on the e. side of Thessaly, near Pelion, separated from Olympus by the vale of Tempe. It is now called Kissavo. The conical summit is covered with snow during the greater part of the year. The ancients placed the seat of the centaurs and giants in the neighborhood of Pelion and Ossa.

The Vale of Tempe separates it from Olympus, 9,794 feet high, and to the southeastward is Mount Plessidi—ancient Pelion—5,308 feet high. These three mountains are renowned in Greek mythology, and the classic phrase 'piling Ossa upon Pelion' refers to the giants Ephialtes and Otus arranging to place Ossa upon Pelion to aid them in reaching the summit of Olympus.

OSSEIN, or OSSEINE, n. *ŏs'sĕ-ĭn* [L. *ossĕus*, belonging to bone—from *os*, a bone]: bone-cartilage, the organic constituent of bone, a substance closely resembling gelatine, into which it is converted by continuous boiling. It is obtained by the prolonged action of dilute hydrochloric acid on bone, which dissolves all the earthy matter. The material thus procured retains the form of the bone without its hardness. It is insoluble in water, but is converted into gluten (one of the forms of gelatine) by the action of boiling water—which transformation is much facilitated if a little acid be present. The O. yielded by different kinds of animals requires different times for its conversion into gluten.

OSSELET, n. *ŏs'sĕ-lĕt* [F. *osselet*, a small bone—from L. *os*, a bone]: a hard substance found growing between the small bones of a horse's knee; an ossicle.

OSSEOUS, a. *ŏs'sĕ-ŭs* [L. *ossĕus*, belonging to a bone—from *os*, a bone—gen. *ossis:* It. *osseo*, osseous]: composed of or resembling bone; bony. OSSEOUS BRECCIA, *brĕk'shĭ-ă*, bones, and fragments of bones, cemented together by calcareous or other matter, found in caverns or fissures.

OSSETER, n. *ōs'sĕ-tĕr* [Russ. *osetr*, a sturgeon]: a species of sturgeon, said to yield one of the best kinds of Russian isinglass.

OSSIAN, *ŏsh'an* or *ŏsh'ĭ-an* POEMS OF: poetic writings set forth as those of Ossian, or Oisin (a word interpreted the 'little fawn'). Ossian was a Celtic warrior poet, said to have lived in the 3rd c., and to have been the son of Fingal or Finn MacCumhaill. The poems ascribed to him in MSS. of any antiquity are few and short, and of no remarkable merit. But in 1760-63, a Highland schoolmaster, James Macpherson (q.v.), published two epics, *Fingal* and *Temora*, and several smaller pieces and fragments, which he affirmed to be translations into English prose of Gaelic poems written by O., and preserved by oral tradition in the Scottish Highlands. Their success was wonderful. They were received with admiration in almost every country of Europe, and were translated into French, Italian, Danish, and Polish. But their authenticity was challenged almost as soon as they saw the light, and a long and angry controversy followed. That they were what they claimed to be, was maintained by Dr. Blair, Lord Kames, the poet Gray, and Sir John Sinclair. That they were more or less the fabrication of Macpherson, was maintained by

Dr. Johnson, David Hume, Malcolm Laing, and John Pinkerton. While this controversy still raged, another sprang up scarcely less angry or protracted. Macpherson made O. a Scotch Highlander, but the Irish claimed him as an Irishman. The fact is he was both: for in those early times, n. e. Ireland and the w. coast of Scotland were practically one country; the people spoke one language, they were of one blood; and the narrow strip of sea that divided them served not as a wall of separation, but rather for easy communication by boats. As to the real authorship of the poems, as the original MSS. used by Macpherson have never been produced, there will always remain doubts; it is certain that he did use materials of the same nature as the Ossianic traditions that may be picked up from the mouth of the people in many parts of Ireland and the Highlands at the present day; but how far under Macpherson's hands they were remodelled remains a secret. The contribution to this question made by J. F. Campbell in *Leabhar na Feinne*—digest of all the Ossianic ballads either published by others or collected by Campbell—has tended somewhat to clear up the matter. No trace of Macpherson's two large poems has been recovered. On one point all Gaelic scholars seem agreed—that Macpherson did not, and could not have written the Gaelic (see Encyc. Brit., 9th ed. 'CELTIC LITERATURE'). Poems ascribed to O., committed to writing in the Highlands in the first half of the 16th c., are printed in the *Dean of Lismore's Book* (Edin. 1862), with translations into English and into modern Gaelic. The poems ascribed to O., preserved in Ireland, were pub. by the Ossianic Soc. in six vol. (Dublin 1854–61). Students of the Ossianic poems will find much assistance from consulting the ed. of the Gaelic with a new translation by Dr. Clerk of Kilmallie (Edin. 1870). In 1876 the O. controversy was again agitated, but came to nothing.—See GAELIC (Language and Literature).

OSSICLE, n. *ŏs'sĭ-kl* [L. *ossic'ulum*, a small bone—from *os*, a bone—gen. *ossis*]: a little bone—applied to various small bones in the skeleton; a term applied to the bony points and segments of star-fishes, encrinites, and similar animals. OSSICULA, n. plu. *ŏs-sĭk'ū-lă*, or OSSICLES, n. plu. *ŏs'sĭ-klz* [L. *ossicula*, small bone]: any hard structures of small size, such as the calcareous plates in the integument of the star-fishes, or the small bones of the ear.

OSSIFEROUS, a. *ŏs-sĭf'ėr-ŭs* [L. *os*, a bone—gen. *ossis; fero*, I produce]: producing bone; containing or furnishing bone.

OSSIFIC, OSSIFICATION: see under OSSIFY.

OSSIFRAGE, n. *ŏs'sĭ-frāj* [L. *ossĭfrăgus*, the sea-eagle—from *os*, a bone; *frango*, I break: It. *ossifrago*]: the osprey or sea-eagle: see OSPREY.

OSSIFY, v. *ŏs'sĭ-fī* [F. *ossifier*—from L. *ossĭficāre*—from L. *os*, a bone—gen. *ossis; fīō*, I am made]: to convert into bone or a bone-like substance; to become bone. Os'SIFYING, imp.: ADJ. becoming bone; bone-forming. Os'SIFIED, pp. *-fīd:* ADJ. converted into bone or a substance resembling it. OSSIFIC, a. *ŏs-sĭf'ĭk*, having power to ossify. OSSIFICATION, n. *ŏs'sĭ-fī-kā'shŭn* [F.—L.]: changing of any soft solid part of an animal body into bone or bony-like matter. At a very early period of embryonic life, as soon, indeed, as any structural differences can be detected, the material from which the bones are to be formed becomes mapped out as a soft gelatinous substance, distinguished from the other tissues by being rather less transparent, and soon becoming decidedly opaque. From this beginning the bones are formed in two ways: either the tissue just described becomes converted into cartilage, afterward replaced by bone, or a membrane is formed in which the ossifying process takes place.

The time at which ossification commences does not at all follow the order in which the primordial cartilage is laid down. Thus the cartilage of the vertebræ appears before there is any trace of that of the clavicle, yet at birth the ossification of the latter is almost complete, while that of the former is very imperfect for many years. The process of ossification as it occurs in the human femur or thigh-bone, is the following: Ossification begins in the interior of the cartilage at determinate points, hence termed *points* or *centres of ossification:* from these the process advances into the surrounding substance. In the second month of fetal life, one of these centres shows itself about the middle of the shaft, and from this point ossification rapidly extends upward and downward along the whole length of the shaft. The upper and lower ends remain cartilaginous, and it is not till the last month of fetal life that a second centre appears at the lower end. The third centre, from which the upper end of the bone is ossified, does not appear till about a year after birth. The bone now consists of two extremities or *epiphyses*, with an intermediate shaft or *diaphysis;* and the superior epiphysis is not ossified to the shaft until about the 18th, and the inferior until after the 20th year. At about the 5th year, a fourth ossific centre is developed in the cartilage of the greater trochanter, and a fifth centre appears in the lesser trochanter at about the 14th year. These osseous processes, thus developed from special ossific centres, are termed *apophyses*. Most of the long bones are developed in a corresponding way. It is a curious fact (so general that it may be regarded as a law) that in the skeletons both of man and of the lower animals, the union of the various apophyses to the epiphyses, and of the epiphyses to the diaphysis or shaft, takes place in the inverse order to that in which their ossification began. The advantages derived from this subdivision of the long bones into segments, with interposed cartilaginous plates, are ob-

vious. Besides the greater facilities for growth thus afforded, the flexibility of the bony framework is thereby greatly increased, and its escape from injury during the many falls incidental to this period of life is in no small degree attributable to this cause.

In one sense, the osseous tissue formed in regeneration of destroyed or fractured bones, may be regarded as due to a morbid, though a restorative action. Hypertrophy of bone is not rare; being sometimes local, forming a protuberance on the external surface, in which case it is termed an *exostosis;* and sometimes extending over the whole bone or over several bones, giving rise to the condition known as *hyperostosis.* Again, true osseous tissue occurs sometimes in parts in which, in the normal condition, no bone existed; e.g., in the dura mater, in the so-called permanent cartilages (as those of the larynx, ribs, etc.), in the tendons of certain muscles, and in certain tumors. *Ossification* sometimes occurs as a morbid process; but in many cases, the term is incorrectly used (especially in the case of blood-vessels) to designate a hard calcareous deposit, in which the characteristic microscopic appearances of true bone are altogether absent. Calcification is the proper term for this process. The diseased condition usually but incorrectly called ossification of the arteries, is of sufficient importance to require notice. In consequence of the deposition of earthy or calcareous matter in the middle coat of the artery, the vessel loses all its elasticity, and becomes a rigid, unyielding tube. All parts of the arterial system are liable to this change; but it is more frequent in the ascending portion and arch of the aorta, than in any other part of that vessel, and is more frequent in the lower extremities than the upper. The affection is usually partial, but occasionally appears almost universal. Old age strongly predisposes to this diseased condition, and probably few very aged persons are altogether exempt from it. There is reason to believe that gout and rheumatism also favor these calcareous deposits. This condition of the arteries may give rise to aneurism, to gangrene of the extremities in aged persons, and to atrophy, and consequent feebleness of the brain and heart. (The coronary arteries, which supply the heart with the arterial blood necessary for its own nutrition, are very often, though not always, calcified in angina pectoris.) Moreover, this condition of the vessels materially increases the risk from severe accidents and surgical operations.

OSSIVOROUS, a. *ŏs-sĭv'ō-rŭs* [L. *os,* a bone—gen. *ossis; voro,* I devour]: bone-eating.

OS'SOLI, Margaret, Marchioness. See Fuller, Margaret.

OSSUARY, n. *ŏs'ū-ėr-ĭ* [L. *osseus,* bony—from *os,* a bone]: a place where the bones of the dead are deposited: a charnel-house.

OSTADE, *os'tâ-dĕh*, Adrian van: painter and engraver of the Dutch school: 1610, Dec. 10—1685, Apr. 27; b. Haarlem. His teachers were Franz Hals and Rembrandt. He followed his art at Haarlem, till the French army of Louis XIV. threatened Holland, when he removed to Amsterdam, where he spent the remainder of his life. Country dancing-greens, farm-yards, stables, interiors of rustic hovels and beer-shops, are the places which he loves to paint; and his persons mostly are coarse peasant carls, men drinking and smoking, or peasant women employed in country work. In everything he did there is bright and vivid naturalness. Not equal to Teniers in originality and quiet humor, he surpasses him in force and fineness of execution, though he is not free from triviality and repetitions, and inaccuracies in drawing. He was a prolific painter, and his works are in very many of the museums and collections of the Netherlands, Germany, France, and England. They have been well engraved by Vischer, Suyderoef, and himself.—Isaac van Ostade, brother of Adrian; also a painter: 1621-49; b. Haarlem; died Amsterdam. He labored to imitate his brother in choice of subjects and in style: but later he cultivated a style of his own. With many blemishes, he shows masterly contrasts of light and shade, and fine figure painting, especially in his winter scenes.

OSTASHKOFF, *ŏs-tâsh-kŏf':* manufacturing district town of Great Russia, govt. of Tver, on the s.e. shore of Lake Seliguer; lat. 57° 10′ n., long. 33° 6′ e. The first settlements on this site are said to have taken place 1230. Pop. over 12,000. Skin-dressing, boot-making, and fishing in the neighboring lakes are principal employments. The woods in the vicinity furnish bark for tanning purposes, and charcoal for the blacksmiths' shops. There are in O. about 40 tanyards, in which skins are dressed, and Russian leather prepared to the amount of $450,000 annually. The leather prepared at Savine's tanyard is known in England, Austria, Italy, and N. America. 280,000 pairs of boots are made annually, and 400 men and 1,000 women are engaged in the manufacture. Manufactures of hatchets and scythes also are carried on. The commerce of O. is small, however, owing to its distance from important lines of communication.

OSTEAL, a. *ŏs'tĕ-ăl* [Gr. *ostĕŏn*, a bone]: belonging to bone. Osteine, n. *ŏs'tĕ-ĭn*, osseous substance or bony tissue. Ostitis, n. *ŏs-tī'tĭs*, inflammation of bone.

OSTEND, *ŏs-tĕnd:* Belgium, a seaport town and pleasure resort, in the province of West Flanders, on the North Sea, 67 miles northwest of Brussels. Ostend is connected by rail with all parts of Belgium, France, and Germany: and steamers ply regularly to and fro from London and Dover. It was strongly fortified prior to 1865, since when the fortifications have been replaced by fine promenades. It has a healthful situation, although on a low sandy coast, and is resorted to for sea bathing,

etc., by about 50,000 visitors annually. Along the sea front is a massive digue or esplanade of stone and terra-cotta, three miles long, forming a fine promenade. The public buildings include the Hotel de Ville, three churches (one finished in 1883), an English church, large Kursaal, barracks, etc. The harbor is not easy of access, but has been greatly improved since 1898; the basins within are extensive, and form the termination of a magnificent line of canals stretching like a network into the interior, and furnishing admirable facilities for commerce. The manufactures are unimportant, the chief being linen, sail cloth, and tobacco. Shipbuilding is also carried on. Cod and herring fishing are considerable industries, and an important branch of trade is oysters, fattened here in large salt reservoirs, and transported as far as Paris. Ostend was founded in the 9th century, walled in 1445, and regularly fortified in 1585 by the Prince of Orange. In the great struggle to throw off the yoke of Spain it sustained a memorable siege from 1601, July 4, to 1604, Sept. 28, during which the besieged lost about 50,000 men, and the Spanish besiegers more than 80,000. Pop. (1900) 39,541.

OSTEND MANIFESTO, The: a term used in the diplomatic history of the United States since 1854. In that year, October 9, a despatch was forwarded to the United States government by the American ministers at the courts of Great Britain, France, and Spain, who had met in the city of Ostend, by the government's request to discuss the Cuban question. The despatch declared that, if Spain would not sell Cuba, self-preservation required the United States to take the island by force, and prevent it from being Africanized like Haiti. The suggestion was not approved in the United States by statesmen or politicians and was strongly condemned.

OSTENSIBLE, a. *ŏs-tĕn'sĭ-bl* [F. and Sp. *ostensible;* It. *ostensibile*, ostensible—from L. *ostensus* or *ostentus*, shown, exposed to view]: declared; manifest; apparent; held forth or avowed, but opposed to *real;* plausible. Osten'sibly, ad. *-blĭ.* Ostensibility, n. *ŏs-tĕn'sĭ-bĭl-ĭ-tĭ*, the quality or state of being ostensible. Osten'sive, a. *-sĭv*, showing; betokening; indirect. Osten'sively, ad. *-lĭ.*

OSTENSION, n. *ŏs-tĕn'shŭn* [L. *ostensio*, a showing]: the exposition or exhibiting of the sacrament of the Eucharist.

OSTEN'SORY. See Monstrance.

OSTENT, n. *ŏs-tĕnt'* [L. *ostentus*, exposed to view]: in OE., appearance; manner; show; a token; portent.

OSTENTATION, n. *ŏs'tĕn-tā'shŭn* [F. *ostentation*—from L. *ostentātĭōnem*, a showing, a display—from *ostendo*, I show or exhibit]: outward show or appearance; ambitious display; parade; pompous vaunting. Os'tenta'tious, ad. *-shŭs*, fond of self-display; boastful; showy. Os'tenta'tiously, ad. *-shŭs-lĭ.* Os'tenta'tious-

NESS, n. *nĕs*, the state or quality of being ostentatious; vain display.—SYN. of 'ostentation'; boasting; boast; parade; pageantry; show; pomp; pompousness; appearance.

OSTEO-, prefix *ŏs-tē-ō* [Gr. *ŏstĕŏn*, a bone]: formed of bone; bony; resembling bone.

OSTEOBLASTS, n. plu. *ŏs'tĕ-ō-blăsts* [Gr. *ŏstĕŏn*, a bone; *blastos*, a bud, a sprout]: the granular corpuscles or cells which cover in a dense layer the osteogenetic substance, and lie in its meshes, constituting the formative elements of bone.

OSTEOCLASTS, n. plu. *ŏs'tĕ-ō-klăsts* [Gr. *ostĕŏn*, bone; *klastos*, broken, fractured]: large compound or giant cells formed in the absorption of bone, and believed to be essential agents in the process of such absorption.

OSTEOCOLLA, *ŏs-tē-ō-kŏl'la:* kind of size or glue made by removing the mineral matter from bones, and dissolving the gelatin; its common name is bone-glue.

OSTEODENTINE, n. *ŏs'tĕ-ō-dĕn'tĭn* [Gr. *ostĕŏn*, a bone; L. *dens* or *dentem*, a tooth]: the substance forming the teeth of vertebrate animals, and covered by the enamel; a substance intermediate in structure between dentine and bone.

OSTEOGEN, n. *ŏs'tĕ-ō-jĕn* [Gr. *ostĕŏn*, a bone; *gennăō*, I produce]: the soft transparent matter in bone which becomes changed into bony tissue. OSTEOGENETIC, a. *ŏs'tĕ-ō-jĕn-ĕt'ĭk*, denoting the soft transparent substance in bone which becomes ossified. OSTEOGENY, n. *ŏs'tĕ-oj'-ĕn-ĭ*, or OSTEOGENESIS, n. *ŏs'tĕ-ō-jĕn'ĕs-ĭs* [Gr. *genĕsis*, origin, source]: the formation or growth of bone.

OSTEOGRAPHY, n. *ŏs'tĕ-ŏg'ră-fĭ* [Gr. *ostĕŏn*, a bone; *graphō*, I write]: a scientific description of the bones. OS'TEOG'RAPHER, n. *-ră-fĕr*, an anatomist of the bony parts of the body.

OSTEOID, a. *ŏs'tĕ-oyd* [Gr. *ostĕŏn*, a bone; *eidos*, resemblance]: like or resembling bone; denoting a class of tumors growing from bone, which themselves contain bone.

OSTEOLEPIS, n. *ŏs'tē-ŏl'ĕ-pĭs* [Gr. *ostĕŏn*, a bone; *lepis*, a scale]: genus of fossil ganoid fish peculiar to the Old Red Sandstone; named from the enamelled bony appearance of the scales. It is separated from its allies by having the two anal and two dorsal fins alternating with each other. Seven species have been described.

OSTEOLITE, n. *ŏs'tĕ-ō-līt* [Gr. *ostĕŏn*, a bone: *lithos*, a stone]: an earthy phosphate of lime, containing, in nearly a pure state, tricalcic diphosphate.

OSTEOLOGY, n. *ŏs'tĕ-ŏl'ŏ-jĭ* [Gr. *ostĕŏn*, a bone; *logos*, discourse]: department of anatomy which treats of the chemical and physical properties of the osseous tissue, and of the shape, development and growth, articulations, etc., of the various bones of which the skeleton

is composed; comparative anatomy: see BONE; OSSIFICATION; SKELETON; ETC. OS'TEOLOG'ICAL, a. *-lŏj'ĭ-kăl*, pertaining to a description of the bones. OS'TEOL'OGER, n. *-ŏl'ŏ-jĕr*, or OS'TEOL'OGIST, n. *-jĭst*, one versed in osteology. OS'TEOLOG'ICALLY, ad. *-lĭ*.

OSTEOMA, n. *ŏs'tĕ-ō-mă* [Gr. *ostĕŏn*, a bone]: an adventitious growth, consisting of a purely bony mass, set upon a bone, forming with it an organic whole; an exostosis.

OSTEOMALAKIA, or OSTEOMALACIA, n. *ŏs'tĕ-ō-mă-lā'kĭ-ă* [Gr. *ostĕŏn*, bone; *malăkos*, soft]: a disease occurring most frequently in women, but sometimes in men, characterized by softening of the bones through progressive disappearance of the earthy salts. It affects the different parts of the skeleton, and deformities are often caused by it. It is mainly confined to adults, does not ordinarily attack the aged, and among women is likely to be associated with pregnancy, or to follow child-bearing, abstention from which affected women should strictly practise. It may progress for years, and then end in fatal complication with lung disease, or through exhaustion. The causes assigned are many, but their determination is as yet incomplete. Surgery has sometimes proved more efficacious than medical treatment in this disease, which demands the most thorough hygienic care in all cases.

OSTEOMYELITIS, n. *ŏs'tĕ-ō-mī'ĕl-ī'tĭs* [Gr. *ostĕŏn*, bone; *mŭĕlos*, marrow]: inflammation of the red osseous medulla, and of the pulp contained in the cancelli of spongy bone: often resulting from injuries which expose the medullary canal to the atmosphere or to mechanical injury. Its indications are—after a bone has been injured or surgically operated on—great tenderness, with swelling, abscess, and dark offensive suppuration. It tends to pass into pyæmia, and is very dangerous.

OSTEOPATHY, *ŏs-tĕ-ŏp'a-thĭ*. *History.*—This new science was first discovered by Andrew Taylor Still prior to 1887. In 1887 he settled at Kirksville, Mo., and began to teach the new method to his sons. He was an expert in setting dislocations and from this sprang the new ideas. The sum of the new philosophy as formulated by Dr. Still, may be expressed as follows: (1) the rule of the artery is absolute in health; obstruction of arterial blood is the origin of disease; (2) the manipulative adjustment of the body permits the agencies within the body to operate and co-operate in the cure of disease; (3) diseases are effects of disturbed nerve action that prevents the fluids of the body from being properly distributed.

The history of Osteopathy is the history of the schools of Osteopathy and the legislative recognition of the system. The American School of Osteopathy was chartered first in 1892, Dr. Wm. Smith being the first teacher, with Dr. A. T. Still as practical demonstrator. In 1894 a new charter was granted this school 'to improve our

present system of surgery, obstetrics and treatment of diseases generally, and place the same on a more rational and scientific basis.' The first class graduated in 1894, March, after a course of 10 months. In 1897 the course was lengthened to 20 months. Among the other colleges fully recognized at the present time are the Pacific College of Osteopathy, 1896; Massachusetts College of Osteopathy, 1898; Philadelphia College of Osteopathy, 1899; American College of Osteopathic Medicine and Surgery, 1900; Still College and Los Angeles College, 1905.

The American College of Osteopathic Medicine and Surgery was chartered by the State of Illinois, requiring (1) entrance requirements equivalent to those of the American Association of Medical Colleges; (2) the maintaining of an independent medical system; 'applying and teaching the osteopathic theories of diagnosis and therapeutics, surgery and obstetrics, so as to maintain the same as an independent system or science of healing.'

The course of study has been gradually extended. In 1894 it was 10 months; in 1897 it became 20 months; in 1904 the Associated Colleges of Osteopathy adopted the three year course, the Chicago and Boston Colleges adopting this standard. In 1905 the other colleges adopted the three year course.

The American Osteopathic Association, a national organization of osteopaths, was first organized in 1897. Since then it has met annually, consisting of over 1,400 members. The Associated Colleges of Osteopathy and the American Osteopathic Association represent the national bodies, governing and regulating the affairs of the colleges and associations. The committee on education with the executive committee of the Associated Colleges of Osteopathy have complete control of the education and supervision of the colleges. The committee on publication has edited a journal since 1901, at present issued monthly as the official organ. State associations are organized in 43 of the states and territories of the Union.

The battle for legislative recognition has been carried on in almost every state in the Union. The first legislation asked and secured was special recognition of the new graduates, the new practice being declared not the practice of medicine under existing laws. The first legislature passing such a law was Vermont, 1896, followed by Missouri in 1897. In 1901 Montana, Missouri, and California created state boards of examination. Among the states recognizing Osteopathy, Wisconsin, Indiana, Kentucky, California, (Hawaii), New York, Texas, Delaware, Oregon, and Utah have representatives on a single board regulating the practice of medicine. Colorado, Maryland, and Massachusetts exempt osteopaths from the provisions of the medical laws. Independent boards exist in Missouri, Vermont, Michigan, Tennessee, Montana, Connecticut, Minnesota, New Mex-

ico, Oklahoma, Arkansas, North Carolina, Idaho, South Dakota, Louisiana, and Ohio (a committee of the medical board), North Dakota retains the original law. Iowa, Kansas, Nebraska, Arizona, South Carolina, Virginia, Wyoming, and West Virginia provide for granting certificates to practice Osteopathy by the state board of medical examiners. In Illinois, Osteopathy is not recognized, but those who wish to practice any other system of healing who do not use medicines internally or externally and who do not use operative surgery may get a certificate to 'treat human ailments,' by examination before the state board of health, but no college education or qualification is required of applicants.

Principles and Practice of Osteopathy.—Osteopathy is that system or science of healing that uses the natural resources of the body as curative agents. To this end means are used for the adjustment of structural conditions and relations that may have become abnormal, in order to insure the proper preparation and distribution of the fluids and forces of the body, and to secure the co-operation of functional activities, so as to promote harmony within the body mechanism.

Osteopathy regards the body as a perfectly constructed and adjusted machine, which, so long as it retains its orderly adjustment, will perform its functions in the preservation of a state of health.

Besides this, the organism has the power of preparing all the chemical supplies, material substances and forces necessary for the building and upbuilding of the organism and its parts, provided the proximate principles of food and water with sufficient oxygen are furnished as raw materials.

If every part of this organism be supplied with blood and nerve force, the organism has the capacity of maintaining its healthy normal state of activity, the vital force of the organism holding the balance between the different functional activities.

Health demands structural adjustment of bone, muscle, ligament, etc., the functions of health being determined by these as the media of manifesting and expressing the relations of the vitality to external existence, which we call living, or life.

Disease is the result of some interference with or obstruction to the proper performance of the functions of the organism of its parts. This is generally an effect of some abnormal anatomical conditions, such as the maladjustment of bones, ligaments, muscles, or organ structures, or the contraction or relaxation of the soft tissues. Such an alteration in the correct anatomical relations of the constituent parts of the body results in an obstruction to the vital forces and vitalized fluids, the nerve force, blood and lymph supply. This obstruction interferes with the harmonious performance of the physiological functions and results in a state of unhealth. This state of unhealth establishes discord in the organism and produces what are technically called diseases,

the disease taking a special form from its location, the obstructive condition or the exciting cause of superficial expression.

The human organism is a perfect vital mechanism. When the tissues are depleted, upbuilding takes place from within by specially prepared tissue foods, the regulation of the repair being guided by internal forces. When the blood is altered in its composition, restoration takes place towards normal by the conjoint action of liver, lungs, and blood forming glands, all uniting to renew the blood substance. When the body becomes febrile through an overplus of heat accumulation or lack of heat dissipation, the thermal mechanism directs the counterbalance in the overactivity of the sweat glands, so as to evaporate heat from the body surface and in the excess of vaso-motor activity to bring to the surface in the blood stream the internal heat surplus. When the heart is overworked, the general cardiac nerve mechanism directs the counterbalance, in the dilation of the superficial blood vessels, to pull away the blood from the heart and relieve the overaction.

The body possesses co-ordinating powers, so that when disorder, irregularity, or suspension of function take place, equilibrium may be established without resorting to any foreign agency. The principal means used by the organism in regulating and restoring the different organic activities are the nerve forces and the fluids of the body.

Blood and lymph possess a definite composition, circulate through a tubular system under absolutely known laws, supply the tissues with food and drain the waste elements into common channels of elimination. The nerve forces originate in the ganglion cells and pass along the paths of the nerve fibres, furnishing stimulus to the healthful activity and nutritive development of every tissue of the body. These are interdependent upon one another, the blood and nerve supplies being necessary for the healthy life of every tissue, blood depending upon nerve force and nerve force upon blood.

Blood has definite vessel paths and nerves have fixed trunk paths. These paths pass between and through the tissue structures of the body. Hence the deviation from normal in bone structure and the abnormal position or variation in size of the soft tissue structures, alter the relations of structure to structure and produce varying degrees of pressure, obstruction or irritation in connection with the blood vessels and nerves.

This condition of interference is greatest at the spine, where the nerve trunks and blood vessels pass out from and enter into the spinal column through small foramina in the bones, the contraction, hardening or thickening of the connecting ligaments intensifying the pressure, obstruction or irritation.

The question is often asked by the laity, 'What produces these lesions?' 'How did such a bone get out of

its place or adjustment?' The strains, sprains, jerks and falls incident to childhood and youth, especially the playful activities of the young, the tension and strain due to the labors of life, the accidents and mischances of every-day life in sitting, walking, lying, are sufficient to produce slight deviations in the structures. Exposure to cold, attitudes of the body in different occupations, and overactivity of the certain portions of the body in certain kinds of work cause the hardening, thickening contraction of the ligaments and muscles; and these in turn produce movements of the bones that alter the structural relations. These alterations in structural relations cause the blood vessels and nerves to become irritated and subjected to pressure or varying degrees of obstruction. When this obstruction or pressure modifies the blood supply to the spinal cord and alters the nerve supply to the organs innervated from the particular region involved, there is an incoordination of the blood and nerve supplies.

Thus, the obstructive conditions involving the nerve and blood supplies depend upon, (*a*) contracture, hardening, thickening of the soft tissues, ligaments, muscles, fascia; and (*b*) slight alterations in the delicate relations of the bone and cartilage structures, either one or both of these being the fundamental condition that produces the incoordination in the mechanics of the body.

When such a condition of soft tissue contracture or hardening exists all over the surface tissue, there is found a state of peripheral tension, producing a strong peripheral resistance, which reacts very harmfully upon the deeper organs, such as the lungs in tuberculosis, the heart and kidneys, the liver, the stomach and intestines in many diseases.

Disease being a result of obstructive interference with the blood and nerve supplies, the logical method of dealing with such disease is to remove the obstructive pressure or irritation, so as to permit the free mechanical play of the structures of the organism in connection with the vitality.

Osteopathic manipulation is directed to removing obstructions. (*a*) Attention is given primarily to the soft tissues because these are the connecting and binding structures, and until these are normal, the bones and cartilages cannot be corrected or at least kept corrected. Contracted, shortened and thickened muscles can be relaxed; tense and thickened ligaments can be reduced by stretching, and hardened fascia can be softened by gentle manipulation or vibration.

(*b*) Next the bone and cartilage structures can be readjusted by articulation or by the skilful manipulation of the framework on the principles of mechanics. These principles of mechanics applied to the bone structures involve: (1) the exaggeration of the maladjustment to free for correction; (2) the application of extension to separate the maladjusted structures; and (3) the correction of the adjustment of the structures by

rotation, articulation, the pull and push movement, or some other well-known mechanical principle.

(*c*) When this correction takes place, the fluids and forces of the body are free to exert recuperative influence upon the diseased parts of the body, the native resources of the body being used for purposes of healing and curing.

For example, tonic treatment consists in the restoration of the circulation, the oxygenation of the blood through proper lung action, the oxidation power of the blood through the metabolic activity of the liver, the detoxination of the blood through the action of the ductless glands, and the elimination of waste elements through the kidneys and skin.

Temperature is controlled through the equilibration of the thermal apparatus of the nervous system, the establishment of vaso-motor equilibrium and the proper activity of the physical methods of heat dissipation, radiation, conduction and evaporation, especially through the sweat system.

Instead of cathartics, intestinal action is restored by the elaboration and distribution of the native secretions of the liver and intestines and the restoration of the isotonic state of the muscle tissue in the intestinal walls.

In the accomplishment of these results what is distinctive in the osteopathic method is, the discovery of the obstructive condition and the correction or the removal of the obstruction, so as to open up the currents of the blood and nerve force, to allow free action to the heart in distributing the blood under vaso-motor regulation and correct distribution of nerve force under the general brain, medulla and spinal action. This principle has been applied to many of the acute and chronic forms of disease with marvelous success. Such application has laid down an empiric foundation for the building up of a system of therapeutics based upon this fundamental principle, osteopathic therapeutics.

The distinctive osteopathic treatment consists of the scientific application of manipulative and other methods on the basis of anatomy, physiology, chemistry and mechanics, so as to utilize the inherent resources of the body to overcome disease and restore health. This is done, (*a*) by manipulation, in the restoration of normal anatomical relations; (*b*) in the removal of obstructions by manipulation; (*c*) by any other method of nature not involving the use of anything alien or foreign to the body proximate principles; (*d*) by stimulating the physiological processes from the great vital centers of the organism, and thus determining the natural chemical secretions and excretions of the body; (*e*) by eliminating poisons accumulated in the system and when these become a constituent part of the tissues in the bioplasmic or metabolic processes, antidoting them.

The etiology of diseases depends upon obstructive conditions or disorder in the form of structural lesions, sanitary, hygienic, toxic and hereditary conditions,

which lower or pervert the vitality of the patient, by obstructing the nerve impulses, stemming the current of arterial or venous blood and thus causing irritation, inflammation or malnutrition. A neurosis is in many cases the fundament upon which acute diseases or acute manifestations of a disordered organism are built.

The new pathology is a pathology of perversion. Prior to the establishment of what are known as morbid anatomy changes, we find perversions in the functions. All cases of disease where pathology exists start in an exaggeration or diminution of physiological activity, due to obstructive or irritative structural or toxic disturbances. This produces an abnormal reaction in some of the functional activities, and when such perverted functioning exists for any length of time, the result is that morbid changes take place in the tissues.

It is here that bacteriology finds a place in the osteopathic field. Bacteria are existent, but before the germ can find lodgment the body must be in a weakened or depleted condition, due to a prior perversion of functioning and consequent neurosis and malnutrition. In fighting against the micro-organisms, therefore, we find pure blood a perfect germicide, healthy tissue cells the strongest phagocytic agents and a readjusted organism the most favorable battleground for the destruction and elimination of the germs and their toxins.

An illustration may be found in tuberculosis. The lung tissues receive their nerve supply from the pneumogastric nerve. Obstruction to or irritation of this nerve cuts off the normal trophic impulses upon which the lungs depend for healthy vitality. Degeneration begins in the membranes when the nerve supply is abnormal. The result is that a pathological condition of exudation is established. Cough results with consequent expectoration. Here is a degenerative state of the lungs which opens up a culture field for the lodgment and development of the tubercle bacilli.

The explanation of the osteopathic cure of certain cases of tuberculosis is found in the removal of the obstructive conditions involving the nerve supply to the lungs, checking thereby the symptoms of constant cough, expectoration and night sweats, which are often taken as the indices of consumption. These symptoms, in reality, represent the stage of perverted functioning, during which the tissue field is in preparation for the degenerative changes of real consumption. When these conditions are controlled there is a nutritive upbuilding of the lungs to the point of resistance to the action of the tubercular germs.

Dr. Thomas J. Mays, in writing on *Pulmonary Consumption* says: 'The lesion is not one originating in the local tissues, but in the nervous system. All forms and phases of pulmonary disease are constantly called forth through the instrumentality of vague disintegration.' Behind the pathology of tubercle formation lies perverted nerve action; and behind this lies obstructive or

irritative conditions causing the abnormal functioning of the nerve and exposing the neurotic lung or other tissue to the micro-organic infection.

The pathways along which nature transmits the currents of vitality to the different organs or tissues are the nervous system. Every organ and tissue is connected in some way with the spinal cord through the spinal nerves, and the sympathetic system establishes its visceral connection everywhere by means of its ramifying branches. Hence the failure to receive vital currents at some particular part of the body will infallibly establish a specific lesion of obstruction or irritation.

Congestion, inflammation and degeneration are primarily due to a failure of the venous drainage system to perform its duty. This is a result of disturbed circulation and depends upon some obstructive condition produced by muscular, ligamentous, or osseous pressure. The removal of the pressure establishes normal drainage and health processes.

In all this work the physician of nature is aided by the first law of Nature's Therapy. Nature always tends toward the normal, preserving while life lasts the normalizing tendencies. This tendency to the normal, however, is valueless, so long as obstructions exist, whatever these may be.

Hence, the main duty of the physician of nature, nature herself being the great physician, is to keep the field of nature's activities free.

To accomplish this certain things must be done: (1) contracting relaxed and relaxing contracted soft tissues; (2) adjusting osseous and cartilaginous structures in their inter-relations; (3) soothing the irritation of overactive tissues by inhibition applied through the nerve centers; (4) arousing torpid or inactive tissues by stimulation applied through the nerve centers; (5) establishing free and uninterrupted currents of vitality by adjusting the entire organism to itself and its parts, as well as adapting the body to its environment of diet, air, climate, sanitation, etc.; and (6) eliminating all toxic and waste elements so that the nutritive conditions may be free from toxic vitiation.

The fundamental principles of the science are the common property of humanity, developed in the history of physical, physiological and anatomical research. There is nothing new claimed for these principles, except their application.

Osteopathy seeks to localize every essential landmark of the body with the view of reaching by manipulative methods the most remote parts of the organism, through the superficial channels nature herself has provided.

OSTEOPHYTE, n. *ŏs'tĕ-ŏ-fīt* [Gr. *ostĕŏn*, bone; *phŭtŏs*, planted, grown—from *phŭō*, I produce]: a term denoting a great variety of bony growths which are formed for the most part, in an inflammatory exudation.

OSTEOPOROSIS, n. *ŏs′tĕ-ō-pō-rō′sĭs* [Gr. *ostĕŏn*, bone; *pōrŏs*, a callosity]: a diseased state of bone which prevents an increase of size of the bone-cells, and a consequent diminution of density, the surface of the bone being at the same time irregular and porous. OSTEOPOROTIC, a. *ŏs′tĕ-ō-pō-rō′tĭk*, of or pertaining to.

OSTERODE, *ōs-tĕh-rō′dĕh:* town of Hanover, Prussia. Cotton, woolen, and linen fabrics and hosiery are extensively manufactured, also lead and copper.

OSTIA, *ŏs′tĭ-â:* city of anc. Latium, at the mouth of the Tiber (whence its name), about 16 m. from Rome. It is said to have been founded by Ancus Martius, and was regarded as the oldest Roman colony. It acquired importance first from its salt-works, the establishment of which is attributed to Ancus Martius; afterward as the port where the Sicilian, Sardinian, and African corn shipped for Rome was landed; yet its name occurs first during the second Punic war. It was long the principal station of the Roman navy; but its harbor was exceedingly bad, and gradually the entrance became silted up with alluvial deposits, so that vessels could no longer approach it, but were compelled to ride at anchor in the open roadstead, and to disembark their cargoes there. At length Emperor Claudius dug a new harbor or basin two m. n. of Ostia, and connected it with the Tiber by a canal. It was named the *Portus Augusti*, and around it soon sprang up a new town called *Portus Ostiensis*, *Portus Urbis*, *Portus Romœ*, and often simply *Portus*. Yet it was not till nearly the close of the Roman empire that the prosperity of Ostia as a city began to decline. Its decay, however, was rapid, and in the 8th c. it was a mere ruin. During the middle ages, a village—the modern Ostia—was built about half a mile above the ancient one; but it has not more than 100 permanent inhabitants, who still carry on the manufacture of salt, established in the pre-historic times of ancient Rome. The ruins of Ostia extend a mile and a half along the banks of the Tiber, and are nearly a mile in breadth.

OSTIARY, n. *ŏs′tĭ-ă-rĭ* [L. *ostĭārĭus*, a doorkeeper—from *ostĭum*, a door or entrance]: the mouth or opening by which a river discharges its waters into a sea or lake.

OSTIOLE, n. *ŏs′tĭ-ōl* [L. *ostĭŏlum*, a little door—from *ostĭŭm*, an entrance]: in *bot.*, a longitudinal opening or mouth formed by two crescent-shaped cells. OSTIOLUM, n. *ŏs′tĭ′-ŏ-lŭm*, in *bot.*, the orifice through which spores are discharged; the mouth of a perithecium.

OSTITIS, n. *ŏs-tī′tĭs* [Gr. *ostĕŏn*, bone]: a form of bone inflammation, which in its second stage passes on to hardening or sclerosis, or else to suppuration.

OSTRACEOUS, a. *ŏs-trā′shŭs* [L. *ostrĕă*, an oyster or mussel]: pertaining to animals of the oyster family, called OSTRACEA, n. plu. *ŏs-trā′shĭ-ă*, or OSTRA′CEANS, *-shĭ-ănz.*

OSTRACION, *ŏs-trā′shĭ-on:* genus of fishes of the order *Plectognathi:*—OSTRACIONIDÆ: family of the same order. They are remarkably distinguished by having the whole body covered with an inflexible tuberculated coat of mail, formed of six-sided bony scales or plates combined in a tesselated quincuncial manner; the fleshy lips, the fins, and the tail protruding through holes in the armor. The gill-opening appears in the armor as a mere slit, bordered with a skinny edge, but there is a true gill-cover within. There are no ventral fins. The vertebræ are generally coalescent. There is little muscular substance, and in some species it is reputed poisonous; but the liver is large, and yields much oil. Some of the species are known by the names of TRUNK-FISH and COFFER-FISH. They are found mostly in the Indian and American seas.

OSTRACISM, n. *ŏs′tră-sĭzm* [Gr. *ostrakismos*—from *ostrăkon*, a tile, a shell]: in *anc. Greece*, banishment by the popular vote by throwing shells into an urn, the name of the person to be banished being written on each shell; banishment; expulsion. OSTRACIZE, v. *ŏs′tră-sīz*, to banish by the popular voice. OS′TRACIZING, imp. OS′TRACIZED, pp. *-sīzd.—Ostracism*—as a right of temporary banishment of any person whose services, rank, or wealth appeared dangerous to the liberty of his fellow-citizens, or inconsistent with their political equality—was not a punishment for any particular crime, but rather a precautionary measure to remove leaders whose ascendency was dangerous in the state. O. was introduced by Cleisthenes about the beginning of B.C. 6th c., after the expulsion of the Peisistratidæ. The people were annually asked by the Prytanes if they wished to exercise this right, and if they did, a public assembly was held, and each citizen had opportunity of depositing, in a place appointed for the purpose, a potsherd (*ostrakon*) or small earthen tablet, on which was written the name of the person for whose banishment he voted. Six thousand votes were necessary for the banishment of any person; but the greatest men of Athens—Miltiades, Themistocles, Cimon, Alcibiades, etc.—were subjected to this treatment. The banishment was at first for ten years, but the period was afterward restricted to five. Property and civil rights or honors remained unaffected by it. Alcibiades succeeded in obtaining the final abolition of O·, of which, however, Plutarch and Aristotle speak as a necessary political expedient, and its utility has been ably defended in modern times by Grote (*History of Greece*, iv. 200 *et seq.*).

OSTRACITE, n. *ŏs′tră-sīt* [L. *ostrĕă*; Gr. *ostrăkon*, a shell]: a term applied to any fossil oyster.

OSTRACODA, n. plu. *ŏs-trăk′ō-dă*, or OSTRACODES, *ŏs-trăk′ō-dēz* [Gr. *ostrăkon*, a shell; *eidos*, appearance]: an order of crustaceans inclosed in bivalve shields. OSTRACOID, a. *ŏs′tră-koyd* [Gr. *eidos*, resemblance]: having the nature of shell.

OSTREACULTURE, n. *ŏs′trē-ă-kŭl′tūr* [L. *ostrĕă*, an oyster; *cultūra*, tillage]: the artificial cultivation or breeding of oysters.

OSTRICH, n. *ŏs′trĭch* [OF. *austruche* and *ostrusce*, an ostrich: Sp. *avestruz*, an ostrich—from L. *avis*, a bird; *struthio;* Gr. *strouthion*, an ostrich—from *strouthos*, a bird], (*Struthio*): genus of birds of the order *Grallatores*, and tribe *Brevipennes* (q.v.), in Cuvier's system—the order *Cursores* (or Runners) of some ornithologists. In this genus the bill is of moderate length, broad, flattened, rounded at the tip, the mandibles are flexible; the head is small; the neck long; the legs are long (both tibia and tarsus) and very robust, the lower part of the tibia, as well as the tarsus, naked; the feet have only two toes, of which the inner is the largest, and has a short claw, the outer has no claw; the wings are too short for flight, but aid in running; the plumage is lax and flexible; the wings and tail have long soft drooping plumes. Only one species is known (*S. camelus*), native of the sandy deserts of Africa and Arabia; the S. American ostriches, or Nandus (q.v.), constituting a distinct genus. The O. is the largest of all birds now existing, being six to eight ft. in height to the top of its head, and an adult male weighing two to three hundred lbs. The male is rather larger than the female. The head and upper part of the neck are scantily covered with a thin down, through which the skin is visible. The young have the head and neck

Ostrich (*Struthio camelus*).

clothed with feathers. The general plumage is glossy black in the adult male, dark gray in the female and young, with a slight sprinkling of white feathers; the long plumes of the wings and tail are white, occasionally marked with black. On each wing are two plumeless shafts, not unlike porcupine's quills. The inner toe is very large, about seven inches long, and its claw hoof-like. The sternum is destitute of a keel, and the muscles which move the wings are comparatively weak; but those which move the legs are of prodigious strength, so that the O. is not only capable of running with great

speed, but of striking such a blow with its foot as to make it too formidable for the leopard and other large beasts of prey to assail it. It has been often known to rip open a dog by a single stroke, and a man is recorded to have suffered likewise. The eyes of the O. are large, and the lids are furnished with lashes. Its sight is keen, so that it descries objects at a great distance in the open desert.

The O. shuns the presence of man, but is often seen near herds of zebras, quaggas, giraffes, antelopes, and other quadrupeds. It is gregarious, though the flocks of ostriches are not generally very large. It is polygamous, one male usually appropriating to himself, when he can, two to seven females, which seem to make their nest in common, scooping a mere hole in the sand for this purpose. Each female is supposed to lay about ten eggs. The eggs all are placed on end in the nest, which often contains a large number, while around it eggs are generally to be found scattered on the sand. Concerning these, it has been supposed that they are intended for the food of the young birds before they are able to go in quest of other food; a notion both improbable and without evidence. It seems at least as likely that these scattered eggs are laid by females waiting while the nest is occupied by another, and that they are lost to the ostriches, and no more regarded. Contrary to a generally received opinion, the O. does not leave her eggs to be hatched entirely by the heat of the sun; nor is it the fact, as alleged, that only the male incubates. Both parents assist in the task of watching the eggs. The male and female sit alternately on the eggs for six weeks; the cock sitting all the night, but the female helping in the daytime.

The O. feeds exclusively on vegetable substances, its food consisting in great part of grasses and their seeds; so that its visits are much dreaded by the cultivators of the soil in the vicinity of its haunts, a flock of ostriches soon making terrible devastation of a field of corn. The O. has a very large crop, a strong gizzard, and a large *proventriculus* between the crop and the gizzard: the intestines are voluminous, and the cœca long, with a remarkable spiral valve. There is a receptacle in which the urine accumulates, as in a bladder, a provision rare in birds. The O. swallows large stones, as small birds swallow grains of sand, to aid the gizzard in trituration of the food; and in confinement, has often been known to swallow indiscriminately whatever came in its way, pieces of iron, bricks, glass, old shoes, copper coins, etc. Its instincts do not suffice to prevent it from swallowing very unsuitable things; copper coins were fatal in one instance, and a piece of a parasol in another. The O. is very patient of thirst, or is capable of subsisting for a long time without water. It often supplies the want of water by eating the gourds or melons of the desert, to which even the lion is said to resort on the same account.

The speed of the O., when it first sets out, is supposed to be not less than 60 m. an hour; but it does not seem long capable of this speed. It is successfully hunted by men on horseback, who take advantage of its habit of running in a curve, instead of a straight line, so that the hunter knows how to proceed in order to meet it and get within shot. It is often killed in s. Africa by men who envelop themselves in ostrich skins, and admirably imitating the manners of the O., approach it near enough for their purpose, without exciting its alarm, and sometimes kill one after another with their poisoned arrows. The strength of the O. is such that it can easily carry two men on its back. The voice of the O. is deep and hollow, not easily distinguished, except by a practiced ear, from the roar of the lion. It also more frequently makes a kind of cackling; and when enraged and striking violently at an adversary, hisses very loudly.

The flesh of the O. is palatable when young, but rank and tough when old. It is generally believed to have been prohibited as unclean to the Jews (Lev. xi. 16), though the name is translated *owl* in the English Bible. There are frequent refereuces to it in the Old Testament. The eggs of the O. are much esteemed as food by the rude natives of Africa, and are acceptable even to European travellers and colonists. Each egg weighs about three lbs., and is thus equal to about two dozen ordinary hen's eggs. The egg is usually dressed by being set upright on a fire, and stirred about with a forked stick, inserted through a hole in the upper end. The thick and strong shell is applied to many uses, but particularly is much used by the s. African tribes for water-vessels. In taking ostrich eggs from the nest, the s. African is careful not to touch any with the hand, but uses a long stick to draw them out, that the birds may not detect the smell of the intruder, in which case they would forsake the nest; while otherwise, they will return, and lay more eggs.

The long plumes of the O., from the tail, back, and wings, have been highly valued for ornamental purposes from very early times, and continue to be a considerable article of commerce. See FEATHERS.

The O. sometimes seen in Europe in confinement, readily becomes quite tame and familiar, though still apt to be violent toward strangers. Great numbers were exhibited in the public spectacles by some of the Roman emperors; and the brains of many ostriches were sometimes presented in a single dish, as at the table of Heliogabalus.

Ostrich-farming.—Attempts are being made to increase the supply of ostrich feathers, or to facilitate the procuring of them, by establishing farms—inclosures where the birds can grow and breed in tameness. The ostrich of S. America, the Nandu (q.v.) or *Rhea*, which is easily tamed, it has been asserted by Dr. Vavaseur, can be acclimatized in n. France: his opinion was, that there is no difficulty in domesticating it; and that it will

feed on almost anything given it, however coarse. The birds must not be placed in cages, but must have free range to walk about, secured simply by a leg-guard.

At a meeting of the Cape Agricultural Soc. of Cape Town, s. Africa, 1864, L. von Maltitz gave an account of his experience in ostrich-farming with the African ostrich at Colesberg. Toward the end of 1863, he purchased 17 young ostriches three or four months old, and placed them in an inclosure of 300 acres, over which they had free run. They subsisted wholly on the herbage of the inclosure, with only a little grain given them occasionally. The opinion formed from many months' observation was, that 35 ostriches might find sufficient sustenance upon 300 acres of good grazing-ground. 1864, Apr., he had the wings of the birds cut at the point where the well-known ostrich feathers grow; and they were fit again to cut six months later. The birds were so tame that they allowed themselves to be handled, and their plumage minutely examined. Having caused the birds and the feathers to be examined by experienced dealers, he found that the largest feathers, of which there are 24 on the wing of each male bird, were worth $125 per lb.; and that one plucking of his 17 birds would yield $50 each on an average. The birds cost him about $25 each. Since this experiment, ostrich-farming has become a recognized industry at the Cape. The price of a healthy bird a week old is $50; at six months, $150. The feathers may be plucked when the bird is a year old, and each crop is worth about $35 a bird. The price of the feathers ranges, according to quality, from two or three dollars per lb. to $200 or $250. In 1875 there were 32,247 domesticated ostriches in Cape Colony. It is found that 600 acres of grass are required to feed 80 birds; and when the grass is poor, the ostriches are fed on supplies of shrubs and occasionally on Indian corn. The adult birds require to be kept in separate paddocks, which are generally surrounded by wire-fencing. The egg of the ostrich, though coarse, is reasonably good food; but the naturalization of the bird derives most of its prospective importance from the feathers, for which there is at all times a large demand in the chief European countries, and a market in the United States also.

OSTRICH FEATHERS, in Heraldry; occasionally borne as a charge, and always represented drooping. Three white ostrich feathers are the well-known badge of the Prince of Wales. According to common tradition, they were assumed in consequence of Edward the Black Prince having plucked a plume of ostrich feathers from the casque of John of Luxemburg, King of Bohemia, who fell by his hand at Crécy. There is, however, no doubt that ostrich feathers were previous to that time a cognizance of the Plantagenets. Prince Henry, eldest son of James I., established the present arrangement of the three ostrich feathers within a prince's coronet.

OSTROG, *ŏs-trŏg′:* small district town of w. Russia, govt. of Volhynia, 100 m. w. of Jitomir. Here, in the reign of Constantine of Ostrog, a school and typography were established, and the first Slavonic Bible printed 1558. Pop. (1885) 16,522 ; (1890) 16,891.

OSTROGOTH, n. *ŏs′trŏ-gŏth* [Dan. *ost*, east, and *Goth*]: one of the eastern Goths, as opposed to *Visigoth*, one of western Goths: see GOTHS.

OSTUNI, *ōs-tô′nē:* city of s. Italy, province of Lecce, 22 m. w.n.w. from Brindisi, on the railway between Ancona and Brindisi; on a steep hill. The city is a flourishing one.

OSUNA, *o-sō′nȧ:* town of Spain, province of Seville, 48 m. e.s.e. of the city of Seville, in a fertile plain, and on a triangular hill crowned by a castle and the collegiate church. The plain is productive in grain, olives, almonds, etc. An extensive panoramic view is obtained from the castle. The collegiate church, in mixed Gothic and cinque-cento style, built 1534, was pillaged by Soult of 5 cwt. of ancient church plate, and was converted by him into a citadel and magazine. The people are engaged in agriculture and in the manufacture of linen goods, and iron and earthenware.

OS′WALD, SAINT, King of Northumbria: about 604–642, Aug. 5 (reigned 635–642); son of King Ethelfrith. After the death of his father in a battle with the king of East Anglia 617, he fled to a monastery in Scotland or Ireland where he was instructed in the doctrines of Christianity, and is said to have been baptized. He returned to England 633, and in a battle with Ceadwalla near Hexham 635 secured the throne. He married Cyneburg, daughter of a West Saxon king, on condition of her acceptance of Christianity. He introduced Christianity throughout his dominions, and greatly improved the condition of his subjects. His army was defeated and he was killed at Maserfield in a battle with Penda, pagan king of Mercia. He was canonized by the Rom. Cath. Church, and Aug. 5 was marked in the calendar as his day. A cross which he erected on the field of his victory 635 is said to have been the means of many miracles, and numerous legends relating to his career have been published.

OSWALD, *ŏz′wald*, ELEAZER: about 1755–1795, Sep. 30; b. England. His sympathy with the colonists led to his removal to this country about 1770. He engaged in the revolution, was active at Ticonderoga and Quebec, became lieut.col. of artillery 1777, and received honorable mention for gallant service at the battle of Monmouth. While connected with the *Maryland Journal* he became unpopular on account of the publication of Gen. Charles Lee's reflections on the conduct of the war by Washington. He removed to Philadelphia, where he published an intensely partisan paper called the *Independent Gazetteer*. He also established the first com-

mercial paper in the United States, which he issued monthly as the *Price Current*. In New York 1782-87 he published the *Independent Gazette*, in which he violently opposed the policy of Alexander Hamilton. He became an officer in the French army 1792, was sent by the French govt. on a mission to Ireland, returned to this country, and died of yellow fever soon after reaching New York.

OSWALD, Felix Leopold: American naturalist: b. Namur, Belgium, 1845, Dec. 6; d. 1906, Sept. 27. He was graduated from the University of Brussels in 1865 and studied later at Göttingen and Heidelberg. He became a physician; but later abandoned the practice of medicine, came to the United States and devoted himself to natural history. He published *Summer-Land Sketches* (1880); *Physical Education* (1882); *The Secret of the East; or, The Origin of the Christian Religion* (1883); *Days and Nights in the Tropics* (1887); *The Bible of Nature; Body and Mind; Zoological Sketches;* etc.

OSWEGO, *ŏs-wē'gō:* Kan., city, county-seat of Labette County; on the Neosho River, and the Missouri, Kansas & T. and the Saint Louis & S. F. R.R.'s; 132 miles south-southeast of Topeka. The river furnishes excellent water-power, and there are a number of mills, including flour-mills. It is also the centre of a grain and live-stock region; and there is some coal in the vicinity. A public library is maintained by the Library Association. Pop. 2,580.

OSWEGO: N. Y., city, port of entry, county-seat of Oswego County; on Lake Ontario at the mouth of the Oswego River, and at the northern terminus of the Oswego Canal. It is on the Delaware, Lackawanna & W., the New York, Ontario & W., and the New York Central & H. R. R.R.'s; about 35 miles north by west of Syracuse. Oswego was founded, in 1724, as a trading post and military station. It was incorporated as a village in 1828, and 1848 was chartered as a city. It was one of the most important places on Lake Ontario and in wars which took place along the northern frontier it was always considered a vantage ground and its possession was contested. In the French and Indian war and King George's war, Colonel Mercer built here two forts, strong for the times, 1755. In 1756, August, the place was captured by General Montcalm, who destroyed the forts. This capture of Oswego was considered one of the important events of the French and Indian war. About 30 men on each side were killed or wounded and 1,690 of the British were taken prisoners. Oswego was made the centre of the military operations along the lake and, in the year 1759, General Amherst started from this place, with a force of 10,000 men, for Quebec where Wolfe was in command. Oswego was the meeting place in 1776, between Sir William Johnson and Pontiac, and at this meeting the latter submitted to the British. In the War of 1812 this place was again a disputed point.

Its good harbor was always an attraction. On May 6, 1814, a British force attacked the place and captured it. After peace was restored, the place prospered and grew steadily as an important lake port and a shipping point for the products of the rich farms of the vicinity. When the West began to develop as a wheat country, and the grain was at first sent East to be manufactured into flour, Oswego was one of the chief points of manufacture and re-shipment. The grain elevators and flour mills were then prominent features along the river and canal. The opening of the flour-milling industry in the West, near the wheat-fields, deprived the city of its great industry, from which loss it did not recover for years. The excellent water-power was finally used for manufacturing other products, and the city has now a large starch factory, machine-shops for oil-well supplies, boiler and engine works, knitting mills, car spring works, match and cigar factories, shade cloth mills, and breweries. The lake trade has increased and the city exports manufactured goods, farm products, and fruit. The harbor, with its outer and inner haven, which can accommodate large steamers, has been so improved that the quantities of coal, lumber, and grain brought here for re-shipment can be handled with great rapidity. The exports amount annually to nearly $3,000,000 and the imports, nearly $700,000. The beautiful parks, the drives, especially near the lake and along the river, fine residences, and grounds, all make an attractive city. Some of the places of interest are the old Fort Oswego, the present Fort Ontario which overlooks the harbor, the government building, the State Arsenal, the court-house, and city-hall. Oswego is noted for its State Normal and Training School, founded by Edward Austen Sheldon. It has fine public and parish schools and the Gerrit Smith Library. The government is administered under a charter of 1896 which provides for a mayor, who holds office two years, and a council. The waterworks are owned and operated by the municipality. Pop. (1910) 23,368.

OSWEGO: a river in New York, formed by the junction of the Oneida and Seneca rivers in the northern part of Onondaga County, and flowing north by west enters Lake Ontario at Oswego. It is 24 miles long and has a fall of 120 feet from its source to the lake. By means of a canal and locks, the river has been made navigable some distance from its mouth.

OSWE'GO TEA: name given to several species of *Monarda*, particularly *M. purpurea*, *M. didyma*, and *M. kalmiana*, natives of N. America, because of the occasional use of an infusion of the dried leaves as a beverage. They belong to the nat. order *Labiatæ*, somewhat resemble mints in appearance, and have an agreeable odor. The infusion is said to be useful in intermittents, and as a stomachic. Some other species of *Monarda* are used in the same way.

OSYMANDYAS, *os-ĭ-măn′dĭ-as:* a great king of Egypt, mentioned by Diodorus and Strabo, who reigned, according to these authors, as the 27th successor of Sesostris, and distinguished himself by his victories—invading Asia with an army of 400,000 men and 20,000 cavalry, and conquering the Baetrians, who had been rendered tributary to Egypt by Sesostris. In honor of this exploit he is said by Hecatæus to have erected a monument which was at once a palace and a tomb, and which, under the name of *Osymandeion*, was renowned for size and splendor in later times. It was said to be in the necropolis of Thebes, or at Gournah, close to the sepulchres of the concubines of the god Amen Ra. The Osymandeion is generally believed to be represented by the extant ruins of the palace of Rameses III. at Medinet Haboo, though great difficulty has been felt in reconciling the descriptions of its magnificence in ancient writers with the dimensions of the modern relic; and Letronne, in *Tombeau d'Osymandyas* (Par. 1831), has even ventured to suppose that it was an imaginary edifice invented by the Greeks from their acquaintance with the great palaces of Thebes; but this skepticism is considered extreme. The name of O. is difficult to recognize among the Egyptian kings, the nearest approach to it being one of the Setis, either the 1st or 2d, called after death, Asiri-Meneptah. Others consider O. the Ismendes of Strabo, or the Mendes of Herodotus. The name of Amenophis may also lie concealed in his name, so much ambiguity pervades the subject.

Diodorus, i. 46 to 50; Strabo, xvii. 8, 11–16; Juvenal, xv. 38; Letronne, *Mem. de l'Inst.* ix. 321; Champollion, *Lettres Écrites*, 260, 303; Champollion-Figeac, *L'Égypte*, 69, 291, 313–315.

OTACOUSTIC, a. *ōt′ă kow′stĭk* [Gr. *ōta*, ears; *akoustikos*, belonging to the sense of hearing]: assisting the sense of hearing: N. an instrument for assisting hearing; called also an OT′ACOUS′TICON, n. *-kow′stĭ-kŏn.*

OTAGO, *ō-tâ′gō:* one of the most recent settlements, but the most prosperous, populous, and likely to become the most influential 'provincial district' of New Zealand. Since the re-incorporation of Southland—a portion of its territory which (1861) was parted from O. and raised into a small separate province, an experiment which soon failed—it is the most southern province of South Island (see NEW ZEALAND). O. is bounded n. by the province of Canterbury, and w., e., and s. by the Pacific Ocean; has length 200 m., breadth 160 m., with an invaluable line of coast 400 m.; area about 15,500,000 acres—more than 24,000 sq. m. The chief rivers are the Waitaki, the Clutha, and the Mataura, all flowing s.s.e., and navigable to some extent. The w. regions of O. remain unsurveyed, but are known to be covered with high, and in many cases snow-capped mountains, stretching along the whole line of coast, and extending inland more than 60 m. E. and n.e. from the Mataura river to the shore the surface is

well known, and consists of mountain-ranges with their valleys, extending parallel to the sea and to each other as far inland as the valley of the Manuherikia, one of the first affluents of the Clutha. The climate of O. is exceedingly healthful and invigorating; frost and snow are unknown except in the higher ranges, and rain, though sufficiently abundant to answer the demands of agriculture, does not interfere with outdoor occupations. All the English fruits and flowers, with insignificant exceptions, are grown here to perfection. The n. and interior districts of the province are eminently adapted in both soil and climate for agriculture as well as cattle-breeding. The w. districts are rugged, and covered with forests; but in the e. regions are many fertile and well watered tracts, admirably suited for production of corn, and rearing of cattle and sheep. In mineral wealth the province is remarkably rich. Coal, iron, copper, silver, lead, etc., have been found, and useful earths and clays are abundant. Gold has been found in small quantities in other provinces of New Zealand, as in Auckland and Nelson Province; but by far the most important gold-fields of the colony are in the province of Otago. Gold was discovered here 1861, June, in a gully, since called Gabriel's Gully, on the Tuapeka, affluent of the Clutha, 37 m. w. of Dunedin. Read placed his discovery in the hands of govt., and was presented by the provincial council with £500 as a reward. In less than two months from the discovery of gold, 3,000 people were at work in the Tuapeka valley, and were obtaining 6,000 oz. a week. From this time gold-mining became a staple employment. A 'rush' was made from Australia; Dunedin, formerly the village-capital of the province, rapidly increased in size and trade, new fields were discovered, and the immigration-lists were immensely swelled. From 1861, June, to 1863, June, 700,000 oz., worth nearly £3,000,000, were obtained. The most productive gold-field hitherto discovered is the Arrow River District, in the vicinity of Lake Wakatip. This district was made known 1862, Nov., and from that time to 1863, Oct. 31, 237,655 oz.—value £955,620 (=$4,650,524)—were forwarded to Dunedin. The value of the gold exported from O. to the middle of 1880 was £15,818,948 (=$76,982,-910). In 1880 the total exports were valued at £1,989,-901 (=$9,683,853), imports £1,988,101 (=$9,675,093). Gold, wool, timber, and agricultural produce are principal articles of export. In agriculture, the chief growths are wheat, oats, barley, potatoes, and hay: 1880 there were 53,771 acres in wheat, 143,165 in oats, 10,114 in barley, 5,290 in potatoes, 111,278 in grass. The first band of settlers reached the shores of O. in the spring of 1848. The capital is Dunedin (q.v.), whose pop., with its suburbs and various boroughs was (1881) 42,802. O. was originally a class colony connected with the Free Church of Scotland; but the influx of immigrants consequent on the discovery of gold has obliterated its distinctive character. Pop. (1891) 153,097; (1901) 173,145.

OTAHEITE: see TAHITI.

OTAHEITE APPLE, n. *ō-ta-hī'tĕ ăp'pl:* in *bot.*, *Spondias dulcis*, a handsome tree, the fruit of which is of a golden color, has a flavor like that of a pineapple, and hanging in little nodding bunches; cultivated in the Society and Friendly Islands, especially in Otaheite (Tahiti).

OTALGIA, n. *ō-tăl'jĭ-ă* [Gr, *ōta*, ears; *algos*, pain]: neuralgia of the ear. It occurs in fits of excruciating pain, shooting over the head and face, but is not accompanied by fever, nor usually by any sensation of throbbing. Its causes and treatment are those of neuralgia generally, but it is caused particularly by caries of the teeth, and always requires careful examination by a dentist. When patients complain of *ear-ache*, the pain is far more commonly due to *Otitis* (q.v.), or inflammation of the tympanic portion of the ear, a much more serious affection.

OTARY, *ō'ta-rĭ* (*Otaria*) : genus of the Seal family (*Phocidæ*), distinguished from the rest of the family by a projecting auricle or auditory conch (often popularly called 'external ear'), and by a very remarkable character, a double cutting edge in the four middle upper incisors. The membrane which unites the toes of the hind-feet is prolonged into a flap beyond each toe. The fore-legs, as if intended exclusively for swimming, are placed further back in the body than in the true seals, giving the otaries the appearance of having a longer neck. The hind-legs are more like the fore-legs than in the true seals.—The Sea Lion (*O. jubata* or *O. Stelleri*) of the northern seas is about 15 ft. in length, and weighs

Sea Lion (*Otaria jubata*), female and calf.

about 16 cwt. It inhabits the e. shores of Kamtchatka, the Kurile Islands, etc., and is in some places extremely abundant. It is partially migratory, removing from its most northern quarters on the approach of winter. It is found chiefly on rocky coasts and islet rocks, on the ledges of which it climbs, and its roaring is sometimes useful in warning sailors of danger. It is much addicted to roaring, which, as much as the mane of the old males, has obtained for it the name sea lion. The head of this animal is large; the eyes very large; the eye

brows bushy; the hide thick; the hair coarse, and reddish; a heavy mass of stiff, curly, crisp hair on the neck and shoulders. The old males have a fierce aspect, yet they flee in great precipitation from man; but if driven to extremities, they fight furiously. Sea lions are capable of being tamed, and become very familiar with man. They are polygamous, but a male generally appropriates to himself only two or three females. They feed on fish and the smaller seals.—The sea lion of the southern seas, once supposed to be the same, is now generally believed to be a distinct species, and, indeed, more than one species are supposed to inhabit those seas.—The URSINE SEAL, URSINE O., or SEA BEAR (*O. Ursina*), inhabitant of the n. Pacific, is scarcely 8 ft. long. The hinder limbs being better developed than in most of the seals, it can stand and walk almost like a land quadruped. The muzzle is prominent, the mouth small, the lips tumid, the whiskers long; the tip of the tongue is bifurcated, the eyes are large, the skin is thick, the hair long, erect, and thick, with a soft underclothing of wool. The food consists of sea otters, small seals, and fish. The ursine seal is polygamous, a strong male appropriating to himself 8 to 50 females. It swims with great swiftness, and is fierce and courageous. Its skin is prized for clothing in the regions in which it abounds. As in the case of the sea lion, it is doubtful if the geographical range of the sea bear extends to the southern seas, or if it is represented there by a similar species. Several other species of O. are inhabitants of the Pacific and southern oceans. The FUR SEAL (*O. Falklandica*), is one of these. It is found on the Falkland Islands, South Shetland, etc. It is of long and slender form, with broad head, and clothed with soft, compact, grayish-brown hair, among which is a very soft, brownish fur. It is gregarious and polygamous. When South Shetland was first visited, its seals had no apprehension of danger, and unsuspectingly remained while their fellows were slain and skinned; but they have since learned to be on their guard. The skin of the fur seal is in great demand, chiefly for ladies' mantles. See SEAL.

OTCHAKOV, *ŏch-â-kŏv′:* small town and seaport of s. Russia, govt. of Kherson, surrounded on all sides by a barren steppe; at the w. extremity, and on the n. shore, of the estuary of the Dnieper, 40 m. e.n.e. of Odessa. It is supposed by some to be the spot where stood the Grecian colony Olbia; by others, to be Tomi, the scene of Ovid's banishment. At the end of the 15th c., the khan of the Crimea built here a strong fortress. Its present name occurs, for the first time 1557. During the wars of Russia with Turkey in the 18th c., O. was alternately the property of each, until it was taken by Potemkin 1788, and definitely annexed to the Russian dominions. The vicinity of Odessa prevents the development of foreign commerce at its port. Pop. (1891) 8,032, the greater part Jews; employed in salting fish for transport to Little Russia.

OTEY, *ō'tĭ*, James Hervey, D.D.: 1800, Jan. 27—1863, Apr. 23; b. Liberty, Va. He graduated from the Univ. of North Carolina 1820, was a tutor in that institution 1820–23, in the latter year commenced teaching at Warrenton, N. C., was ordained deacon and priest in the Prot. Episc. Church 1825, and removed 1827 to Franklin, Tenn., being the first clergyman of the denomination to settle in the state. He afterward removed to Columbia, and later to Memphis. He was consecrated bp. of Tenn. 1834, and labored with energy and zeal to promote the cause of Christ and provide means for religious education of the people. Largely through his efforts the Univ. of the South was established at Suwanee, Tenn. He travelled extensively on missionary tours, and was widely known as "The Good Bishop." His published works include *Unity of the Church* and other discourses, and many sermons and addresses. He d. at Memphis, Tenn.

OTHER, a. *ŭth'ėr* [Goth. *antnar;* Ger. *ander;* Fris. *ander*, other, or: Icel. *annarr;* Skr. *antara*, the other]: not the same; not this but different; correlative to *each*, and opposed to *some;* something besides; used as a *noun* with number and case, signifying, not I or he, but some one else, as 'let others judge'. Otherwise, ad. *ŭth'ėr-wīz*, in a different manner; in other respects; by other causes.

OTHMAN', or Othoman', or (usual form) Osman' I., surnamed *Alghazi* ('the conqueror'): founder of the Turkish power and of the dynasty of Osmanli or Ottoman Turks: 1259–1326 (sultan 1299–1326): b. in Bithynia. His father, Orthogrul, chief of a small tribe of Ogûzian Turks, had entered the service of Alla-ed-din Kaikobad, the Seljuk sultan of Iconium, and had rendered important services to that monarch and his successors in their wars with the Byzantines and Mongols. Orthogrul dying 1289, after a rule of more than half a century, his tribe chose his son Osman (i. e., the 'young bustard') as his successor. O. trod in his father's footsteps; and on the destruction of the sultanate of Iconium 1299 by the Mongols, succeeding in obtaining possession of a portion of Bithynia. He had previously subjugated many of the neighboring Oguzian chiefs, and this new accession of territory rendered him powerful enough to attack the Byzantines with success. 1299, July, he forced the passes of Olympus, and took possession of the whole territory of Nicæa, with the sole exception of the town of Nicæa, which resisted his efforts for five years longer. In 1301 he defeated Emperor Andronicus II. at Baphaeon; 1307, he incorporated the province of Marmara in his dominions; and till his death, steadily pursued his plans of conquest. 'Othman,' says Knolles, 'was wise, politic, valiant, and fortunate, but full of dissimulation, and ambitious above measure; not rash in his attempts, and yet very resolute; to all men he was bountiful and liberal, especially to his men of war and

to the poor. Of a poor lordship, he left a great kingdom (Phrygia, Bithynia, and the neighboring districts), having subdued a great part of Asia Minor, and is worthily accounted the first founder of the Turks' great kingdom and empire.' O. assumed the title Sultan (though this is denied by many historians) on the extinction of the Iconium sultanate 1299, held his court at Kara-Hissar, and struck money in his own name. From him are derived the terms Ottomans, Othomans, and Osmanli or Osmanlû, employed as synonomous with Turks. See OTTOMAN EMPIRE.

OTHMAN IBN AFFAN, *ŏth-mân' ĭb'n âf-fân' :* third Caliph of the Moslems: b. about 574; of the family of the prophet, and cousin-german of Abu Sofîan. One of the early converts to Islam, he was one of its most zealous supporters, and linked himself still more strongly to Mohammed by becoming his son-in-law and private secretary. He was elected to succeed Omar in the Caliphate 644, Dec., and a most unworthy successor he proved to be. The Moslem empire, however, continued to extend itself on all sides till the insane nepotism of O. gave its progress a sudden check. The able and energetic leaders who had been appointed by Omar were superseded by members of O.'s own family, and of that of Abu Sofîan. Egypt revolted, and the caliph was compelled to reinstate Amru in the govt. of that country; and several other rebellions were quelled only by a similar restoration of the previous governors. Zealous Moslems were indignant at seeing the chair of the prophet occupied by O., while Abu-bekr, and even Omar, were accustomed to seat themselves two steps below it. Emboldened by his vacillating and cowardly disposition, they showered upon him reproaches and menaces; but the bearer of their remonstrances having been bastinadoed by O.'s order, a general revolt ensued. O. averted the crisis by unconditional submission; but having soon afterward attempted to put to death Mohammed, son of the Caliph Abu-bekr, the latter made his appearance at Medina at the head of a troop of malcontents, and forcing his way to the presence of O., stabbed him to the heart. O. was the first to cause an authentic copy of the Koran to be composed.

OTHO, *ō′thō*, MARCUS SALVIUS, Roman Emperor: 32, Apr. 28—69, Apr. 15 (reigned 69, Jan. 15–Apr. 15); of an ancient and noble Etruscan family. He was a favorite companion of Nero, who appointed him gov. of Lusitania. On the revolt of Galba against Nero, O. joined himself to the former; but, disappointed in his hope of being proclaimed Galba's successor, he marched at the head of a small band of soldiers to the forum, where he was proclamed emperor, and Galba was slain. O. was recognized as emperor over all the Roman possessions except Germany, where a large army was stationed under Vitellius. The first few weeks of his reign were marked by an indulgence toward his personal enemies, and a devotion to business, which, though at variance with his former passionate and reckless habits, excited favorable hopes in the minds of his subjects. But the tide of rebellion raised in Germany by Valens and Cæcina during the reign of Galba had by this time gathered strength, and these commanders having prevailed on Vitellius, who had become a mere good-humored glutton, to join his forces to theirs, the combined army poured into Italy. O. fortunately had several able generals, who repeatedly defeated the rebels; but the prudence of some among them in restraining the enthusiasm of their troops, who wished to press their victories further, was unfortunately considered as cowardice or treason, and produced dissensions in O.'s camp. This encouraged the generals of Vitellius to unite their armies, and fall on the forces of Otho. An obstinate engagement took place near the junction of the Adda and the Po, in which the army of O. was completly routed, and the relics of it went over on the following day to the side of the victor. O., though not yet reduced to extremity, resolved to make no further resistance; settled his affairs with the utmost deliberation; and then stabbed himself, after a reign of only three months.

OTHO I., or THE GREAT, Holy Roman Emperor: 912–973, May 7 (reigned 936–973); son of Henry I. King of Germany, whom he succeeded. His reign was a series of eventful and generally triumphant wars, in the course of which he brought many turbulent tribes under subjection, acquired and maintained almost supreme power in Italy, where he imposed laws with equal success on the kings of Lombardy and the popes of Rome, consolidated the disjointed power of the German emperors, and established Christianity at many different points in the Scandinavian and Slavonic lands beyond his own jurisdiction. His earliest achievement was a successful war against the Bohemian Duke Boleslas, whom he reduced to subjection, and forcibly converted to Christianity; next, the dukes of Bavaria and Franconia were compelled to succumb to his power; the former paying the penalty of his opposition to O. by defeat and death in battle, and the latter by the confiscation of his territories, which, together with the other lapsed and recovered fiefs of the empire, were bestowed on near and devoted

relatives of the conqueror. After subduing the Slavi of the Oder and Spree, for whose Christian regeneration he founded the bishoprics of Havelburg and Brandenburg, driving the Danes beyond the Eyder, compelling their defeated king to return to the Christian faith and to do homage to him; and after founding, at the suggestion of his mother's former chaplain, Adeldag, the bishoprics of Aarhuus, Ribe, and Slesvig, which he decreed were forever to be free from all burdens and imposts, he turned his attention to the affairs of Italy. Here he presented himself as the champion of the beautiful Adelheid, widow of the murdered King Lothaire; and having defeated her importunate suitor, Berengar II. (q.v.), married her, and assumed supreme power over n. Italy 951. The wars to which this measure gave rise, obliged O. frequently to cross the Alps; but at length, after a great victory over the Huns 955, and the defeat and capture of Berengar, O. was acknowledged king of Italy by a diet at Milan; and after being crowned with the iron crown of Lombardy, was, 962, recognized by Pope John XII. as successor of Charlemagne, and crowned Emperor of the West at Rome. O. lost no time in asserting his imperial prerogatives; and having called a council, effected the deposition of Pope John, whose licentiousness had become a burden to Italy and a scandal to Christendom, and caused Leo VIII. to be elected in his place. Fresh wars were the result. Popes and anti-popes distracted the peace of Rome; but through all these disorders, O. maintained the supremacy which he claimed as Emperor of the West, in regard to the election of popes and the temporal concerns of the Roman territories. His later years were disturbed by domestic differences; for his elder son, Ludolph, and his son-in-law, Konrad of Lorraine, having risen in rebellion against him, through jealousy of his younger son and intended successor, Otho, the empire was distracted by civil war. Although the war terminated in the defeat of the rebels, and the recognition of young Otho as king of the Germans, and his coronation at Rome, 967, as joint-emperor with his father, O.'s favorite scheme of uniting the richly-dowried Greek princess, Theophania, with the young prince, met with such contempt from the Greek emperor, that his outraged pride soon again plunged him into war. His inroads into Apulia and Calabria, however, proved convincing arguments in favor of the marriage, and Theophania became the wife of young Otho, with Calabria and Apulia for her dowry. O. died at Minsleben, in Thuringia, and was buried at Magdeburg, leaving the character of a great and just ruler, who had extended the limits of the empire, and restored the prestige of the imperial power more nearly to the stand which it occupied under Charlemagne than any other emperor. He created the duchy of Carinthia, and the markgrafdoms of East and North Saxony; appointed counts-palatine; and founded cities and bishoprics. See Vehse's *Leben Kaiser O.'s des Grossen* (Dresd. 1827).

OTHO II.

OTHO II., surnamed RUFUS, 'the Red,' King of Germany and Holy Roman Emperor: 955–983, Dec. 7 (king 961–973, emperor 967–973); son of Otho I., whom he succeeded. For a time, O. ruled under the regency of his mother, Empress Adelheid; but differences arose through his headstrong and ambitious inclinations, and his mother withdrew, leaving him to his own will, which soon brought him into collision with the great vassals of the crown. Civil war broke out under the leadership of his cousin, Duke Henry II. of Bavaria, who formed a secret alliance against him with Harold, king of Denmark, and Micislav of Poland. For a time fortune favored the rebels; but O.'s astuteness circumvented their designs; and after defeating Henry, and depriving him of his duchy, he marched against the Danish king, who had been making successful incursions into Saxony. O.'s first attack on the Dannevirke having proved of no avail, he retired, vowing that he would return before another year and force every Dane to forswear paganism. Returning to the attack the following year, according to the old chroniclers he caused large quantities of trees, brushwood, and stubble to be piled up against the Dannevirke and set on fire, driving out the defenders. The defeated Harold was soon overpowered by the superior number of the Germans, and compelled to receive baptism, as the badge of his defeat. The next scene of war was Lorraine, which the French king, Lothaire, had seized as a former appanage of his crown; but here, after a partial defeat, O. succeeded in reasserting his power; and then devastated Champagne, pursued and captured Lothaire, and advanced on Paris, one of whose suburbs he burned. Scarcely was this war ended, when the disturbed condition of Italy called O. across the Alps. His presence ended the insurrection at Milan and Rome, where he re-established order; and having advanced into lower Italy, he defeated the Saracens, drove back the Greeks, re-established his supremacy in Apulia and Calabria, which he claimed in right of his wife, Theophania, and made himself master of Naples and Salerno and finally of Tarentum 982. The Greek emperor, alarmed, called the Saracens again into Italy. The result of a battle with their overwhelming numbers was the total defeat of the emperor, who escaped from the hands of the victors only by plunging with his horse into the sea, and swimming, at the risk of his life, to a ship. Unluckily, it was a Greek ship, and O. was virtually a prisoner; but as the vessel neared Rossano, a friendly port, he escaped by a cunning stratagem. O. hastened to Verona, where a diet was held, numerously attended by the princes of Germany and Italy, and at which his infant son, Otho, was recognized as his successor. This diet is memorable chiefly for the confirmation by O. of the franchises and privileges of the republic of Venice, and the enactment of many new laws added to the celebrated Longobard code. O.'s death at Rome arrested the execution of the vast preparations

against the Greeks and Saracens planned at the diet of Verona, and left the empire embroiled in wars and internal disturbances. See Giesebrecht's *Jahrbücher des Deutschen Reichs unter der Herrschaft, Kaiser O.'s II.* (Berl. 1840).

OTHO III., King of Germany and Holy Roman Emperor: 980–1002, Jan. 21 (king 983–996, emperor 996–1002); son of Otho II., at whose death he was immediately crowned as king at Aix-la-Chapelle. For 13 years till O. received the imperial crown at Rome, the government was administered with extraordinary skill and discretion by three female relatives of the boy-king—his mother Theophania, his grandmother Adelheid, and his aunt Matilda, Abbess of Quedlingburg. The princes of the imperial family disputed the right of these royal ladies to the custody of the young king; and Duke Henry of Bavaria, the nearest agnate, having seized the person of O., tried to usurp the supreme power, proposing to govern in his name; but opposed by the majority of the other princes of the empire, he was compelled to release him in consideration of receiving back his forfeited duchy. O. early showed that he had inherited the great qualities of his forefathers, and when scarcely 15 years of age, at the head of his army, defeated the troops of the patrician Crescentius, self-styled consul of Rome, and thus restored order in the Roman territories. In 996 he was crowned emperor by his relative, Pope Gregory V.; and having settled the affairs of Italy returned to Germany, where he defeated the Slaves, who had long been at war with the empire; and having forced Micislav, duke of Poland, to do him homage, he subsequently raised the Polish territories to the rank of a kingdom, in favor of Micislav's successor Boleslas. The renewed rebellion of Crescentius, who drove Gregory from the papal throne, compelled O. to return to Italy, where success as usual attended his measures. Crescentius, who had thrown himself into San Angelo, was seized and beheaded, with 12 of his chief adherents; the anti-pope, John XVI., imprisoned; Gregory restored; and on the speedy death of the latter, O.'s old tutor, Gherbert, Abp. of Ravenna, raised to the papacy under the title Sylvester II. O., elated with success, took up his residence in Rome, where he organized the government, erected new buildings, and showed every disposition, notwithstanding the ill-concealed dissatisfaction of the Romans, to convert their city into the capital of the western empire. The near approach of the year 1000, to which so many alarming prophecies were then believed to point as the end of the world, induced O. to undertake a pilgrimage to the Holy Land, where he founded an archbishopric. On his return, after visiting Charlemagne's grave at Aix-la-Chapelle, and removing the consecrated cross, suspended from the emperor's neck, he again repaired to Rome, to consolidate his schemes of establishing a Roman empire. The insurrection of the Romans frustrated his plans, and escaping from Rome at risk of

his life, he withdrew to Ravenna, to await the arrival of powerful reinforcements from Germany; but before they had crossed the Alps, O. died at the age of 22, apparently from poison.

O'THO I., King of Greece: 1815, June 1—1867, June 26 (reigned 1835-62); b. Salzburg; second son of Ludwig, King of Bavaria. On the erection of Greece into a kingdom 1832, he was appointed by the protecting powers king of Greece. Till he attained his majority, the government was intrusted to a regency. On assuming the government 1835, O. transferred the court from Nauplia to Athens, and passed into law several important measures, which afforded lively satisfaction to his subjects. In 1836 he married Princess Amalie of Oldenburg. The occupation of the Piræus by Anglo-French troops, due to internal disorders and intrigues, restrained the people till 1857; but after their withdrawal, his position became year by year more difficult. The belief that O.'s absolute measures were due to the queen's instigation turned the people against her, and attempts were made on her life. Insurrections at Nauplia and Syra 1862 were suppressed. A more formidable insurrection in the districts of Missolonghi, Acarnania, Elis, and Messenia, in Oct. of the same year, in a few days extended to the whole of Greece; and O. and his queen fled to Salamis, whence he issued a proclamation declaring that he quitted Greece to avoid effusion of blood. A provisional govt. was established, which, 1863, Feb., resigned its power to the national assembly. This body decreed that Prince William of Slesvig-Holstein, second son of Christian IX. of Denmark be elected king as George I., King of the Hellenes.

OTIC, a. *ŏt'ĭk* [Gr. *ous*, the ear, *ōtos*, of the ear]: pertaining to the ear; employed in diseases of the ear. OTIC GANGLION (called sometimes Arnold's ganglion), one of the four cephalic sympathetic ganglia: it is immediately below the foramen ovale.

OTIOSE, a. *ō'shĭ-ōs* [L. *otiōsus*, at leisure—from *otĭŭm*, leisure, vacant time]: being at rest or ease; unemployed.

OTIS, ELWELL STEPHEN: American soldier: b 1838, March 25— ————, at Frederick, Md.; was educated at the University of Rochester, whence he graduated 1858, and after studying law for a year was admitted to the bar of New York. In 1862, Sept. 13, he volunteered for service in the U. S. army with the rank of captain in the 140th N. Y. infantry, and at the close of 1863 was appointed lieutenant-colonel of the regiment, being promoted to colonel 1864. O. took part in all the chief engagements of the Army of the Potomac, and was seriously wounded before Petersburg, Va. He received his discharge 1865, Jan. 24, and was brevetted brigadier-general of volunteers. In 1867 he was commissioned lieutenant-colonel of the 22d Infantry, and promoted to colonel of the 20th in 1880. From 1867 until recently he was stationed on the frontier and fought the Indians. Major-Gen. Otis organized at Leavenworth, Kan., the United States Infantry and Cavalry

School, which he carried on till 1885. After serving in Montana and at Washington, D. C., he was ordered to Manila (1898), where he served with distinction. He was military governor of the Philippines 1898-1900; on his return was promoted maj.-gen., U.S.A., and was assigned to the Department of the Lakes. He was retired 1902, March 25.

OTIS, *ō'tis*, GEORGE ALEXANDER: 1830, Nov. 12—1881, Feb. 23; b. Boston: surgeon. He graduated from Princeton College 1849, and from the medical dept. of the Univ. of Pennsylvania 1851, studied surgery at London and Paris, and 1854 commenced practice at Springfield, Mass. He was a surgeon in the civil war, and became asst. surgeon U. S. army 1866, and was stationed at the surgeon-general's office at Washington. He won several brevets, and was a member of the leading medical societies. He was a contributor to various medical journals, and wrote *Amputation at the Hip-Joint*, *Excisions of the Head of the Femur*, and other monographs. He also prepared a voluminous *Report of Surgical Cases treated in the Army of the U. S. from* 1867 *to* 1871, and edited the surgical portion of the *Medical and Surgical History of the War*. He d. at Washington.

O'TIS, HARRISON GRAY: 1765, Oct. 8—1848, Oct. 28; b. Boston; son of Samuel Alleyne O., and nephew of James O., the patriot orator. He graduated from Harvard College 1783, studied law, and was admitted to practice 1786. As capt. of the militia he aided in suppressing Shay's rebellion 1787, and the following year was the Fourth of July orator at Boston. He soon became a leading lawyer and was popular in social circles. He entered the Mass. legislature 1796, and was a member of congress 1797–1801. In the latter position he was a pronounced federalist. In 1801 he was dist.atty. at Boston, was speaker of the Mass. house of representatives 1803–05, pres. of the state senate 1805–11, and judge of common pleas 1814–18. He was prominent in the Hartford convention 1814, for which he was charged with disloyalty. He was elected to the U. S. senate 1817, but resigned 1822 in hope of being elected the first mayor of Boston. A preliminary canvass indicated that his course at Hartford had made him so unpopular that he could not succeed, and his name was withdrawn. He was elected mayor 1829, held the office 3 years, and passed the remainder of his life as a private citizen. He d. at Boston.

O'TIS, JAMES: 1702, June 14—1778, Nov. 9; b. Barnstable, Mass.; son of Judge John O. He was not educated at college, but studied law, and was very successful in his profession. He was an ardent patriot, a col. of the militia, a member of the legislature for several years, and was speaker of the house 1760–61. He was an unsuccessful applicant for the office of associate justice, was probate judge of Barnstable co. 1763, and became chief-justice of the common pleas 1764. He was

elected member of the governor's council several years in succession, but each time the royal gov., Bernard, refused to ratify the choice. In 1770 Lieut.Gov. Hutchinson admitted his election. For some years O. was pres. of the council.

OTIS, JAMES: patriot and orator: 1725, Feb. 5—1783, May 23; b. West Barnstable, Mass.; son of James O. the chief-justice of common pleas. He graduated from Harvard College 1743, studied literature two years, became a law-student in the office of Jeremiah Gridley, a leading lawyer, was admitted to practice 1748, and settled at Plymouth. Not having sufficient business he removed to Boston 1750, where his practice greatly increased, and he obtained high reputation as an orator and a scholar. He wrote *Rudiments of Latin Prosody*, 1760, which became a standard text-book. He also wrote a book on Greek prosody, but as no printer in the country had Greek type it was not published, and the MS. was lost. His opposition to the royal govt. developed 1761, and was claimed by some to have been greatly intensified, if not wholly caused, by the refusal of Gov. Bernard to give his (O.'s) father the position of chief-justice for which he had applied on the death of Sewall. The effort of the govt. to enforce certain navigation laws which had fallen into disuse made it necessary to test the legality of the writs of assistance which allowed custom-house officers to search houses for smuggled goods without specifying the houses in the warrant. As the advocate-gen. of the govt., it devolved on O. to defend the revenue officers in their efforts to carry out the measure. This he not only refused to do, but resigned his office, appeared against the govt., made a brilliant speech in opposition to the measure itself and its underlying principle, and refused compensation for his services to the people. Decision was reserved till the home govt. could act upon the matter; and though the right to issue the writs was maintained, it is believed that it was no longer enforced. The following year (1762) O. was a member of the state legislature, where he became the leader of the opposition to the royal govt. In justification of his course in opposing a grant to pay the cost of a naval expedition, he published 1764 a pamphlet, *The Rights of the Colonies Vindicated*. It was due to his efforts that the stamp act congress was held in New York 1765, by which he was appointed a member of the committee for appealing the case to parliament. His election as speaker of the Mass. house of representatives was negatived 1767 by Gov. Bernard. His defense of the action of the Mass. legislature in issuing a circular to the other colonies urging resistance to the imposition of taxes by parliament was characterized by sympathizers with the royal party as 'the most violent, insolent, abusive, and treasonable declaration that perhaps was ever delivered.' He was accused in England 1769, by the commissioners of customs, of treason; but refuted the charge and denounced his accusers in the

Gazette of Boston. Soon afterward he met one of the parties, named Robinson, in a coffee room, and in a quarrel which ensued received a cut on the head which greatly aggravated a mental disease of which premonitory symptoms had already appeared. For this injury the courts awarded O. £2,000 damages; but on receipt of a written apology from his assailant he waived his financial claim. He was a member of the legislature 1771, and occasionally attended court, but except for brief periods was insane and wholly incapacitated for business. It is said that unknown to his family he borrowed a musket and took part in the battle of Bunker Hill. While standing in a doorway at his home in Andover he was instantly killed by lightning.

OTITIS, n. *ō-tī′tĭs* [Gr. *ōta*, the ears, and termination *-itis*, denoting inflammation]: inflammation of the tympanic cavity of the ear. It may be either acute or chronic; and may come on during the course of certain febrile affections, especially scarlatina, or in consequence of a scrofulous, rheumatic, or gouty constitution; or it may be excited by direct causes, as exposure to currents of cold air, violent syringing or probing, etc. The symptoms of the acute form are sudden and intense pain in the ear, increased by coughing, sneezing, or swallowing, *tinnitus aurium*, or singing or buzzing noises heard by the patient, and more or less deafness. If the disease is unchecked, suppuration takes place, and the membrane of the tympanum ulcerates, and allows the discharge of pus; or inflammation of the dura mater and abscesses in the brain may be established. In less severe cases there is usually considerable persistent damage, and an obstinate discharge of matter (*otorrhœa*) is a frequent sequence of the disease. The treatment of so serious an affection must be left solely in the hands of the medical practitioner.

The symptons of the cronic and less acute varieties of O. are unfortunately so slight, that they are often neglected, until the patient finds the sense of hearing in one or both ears almost completely gone. In these milder forms, the general treatment is to combat the diathesis on which they frequently depend, and to improve the general health. Small blisters occasionally applied to the nape of the neck or to the mastoid process are often of service in very chronic cases. If there is any discharge, the ear should be gently syringed once or twice a day with warm water, after which a tepid solution of sulphate of zinc (one grain to an ounce of water) may be dropped into the meatus, and allowed to remain there two or three minutes.

OTLEY, *ŏt′lĭ*: small market-town of England, in the West Riding of Yorkshire, on the right bank of the Wharfe, 29 m. w.s.w. of York. Its parish church was built 1507. Extensive cattle and grain markets are held here. Worsted spinning and weaving, machine-making, and manufacture of malt, bricks, and leather, are main occupations. Pop. (1881) 6,303; (1891) 7,838.

OTOCONIA, n. *ŏt′ŏ-kō′nĭ-ă* [Gr. *ōta*, the ears; *kŏnĭă*, dust]: a small mass of calcareous particles or crystals of carbonate of lime, found in the membranous labyrinth of the ear, smaller and more numerous than otoliths.

OTOCRANE, n. *ŏt′ō-krān* [Gr. *ōta*, the ears; *kranĭŏn*, the skull]: the part of the skull which contains the organs of hearing.

OTOLITHS, n. plu. *ŏt′ō-lĭths*, also Ot′olites, n. plu. *-līts* [Gr. *ōta*, the ears; *lithos*, a stone]: the fossil earbones of whales, cartilaginous fishes, etc.; minute calcareous concretions found in the membranous cavities of the ears of many invertebrates.

OTOLITHUS, *ō-tŏl′ĭ-thŭs*: genus of fishes of the family *Sciænidæ* (q.v.), having perch-like form, convex head, with cellular bones, feeble anal spines, no barbels, long curved teeth or *canines* among the other teeth. A valuable species of this genus is the Weakfish, or Squeteague (*O. regalis*), common on the e. coasts of N. America, from the Gulf of Mexico to the Gulf of St. Lawrence, though appearing only in the warmer part of the year. It swims in shoals near the surface, takes bait greedily, and may be readily caught with any soft bait. It enters the mouths of rivers where the water is brackish. The flesh is pleasant, but soon becomes soft. Excellent isinglass is made of the air-bladder.—A number of species of O. are found in the E. Indian seas, some of which are valuable for the isinglass made from their air-bladder, and some are much used as food, both fresh and dried.

OTOLOGY, n. *ō-tŏl′ŏ-jĭ* [Gr. *ōta*, the ears; *logos*, discourse]: the part of anatomy which treats of the ear; a treatise on the ear.

OTOMIS, *o-to-mēz′*, or Othomis′: one of the most ancient and most widely scattered Indian tribes in Mexico. Previous to the appearance of the Toltecs, by whom they were driven to the mountainous regions of the country, they were settled in the valley of Mexico. On the decline of the Toltec power they returned, but were afterward dislodged by the Aztecs. At a later period part of their territory was regained. They became partially civilized before the appearance of the Spaniards by whom they were conquered. Some of the bands accepted Christianity. They occupy the mountainous portions of the states of Querétaro, Hidalgo, and Guanajuato, and numerous bands are found in several other portions of the country. Their language is one of the most unpleasant of all Indian dialects, but many of the people converse in Spanish, and have become Mexican citizens. A grammar and dictionary was published 1767, and several small religious works in the native tongue have been issued.

OTOPTERIS, n. *ō-tŏp′tĕr-ĭs* [Gr. *ōta*, the ears; *pteris*, a fern]: in *geol.*, a genus of fossil ferns, so called in allusion to their ear-shaped projections.

OTORRHŒA, n. *ŏt′tō-rē′ă* [Gr. *ōta*, the ears; *rhĕō*, I flow]: in *med.*, a flow or running of the ear; purulent or muco-purulent discharge from the external ear. It may be due to various causes, of which the most frequent is catarrhal inflammation of the lining membrane of the meatus, and the next in frequency is Otitis (q.v.) in its various forms. If the discharge is very fetid, a weak solution of chloride of lime, or of Condy's Disinfectant Fluid, may be used, in place of the solution of sulphate of zinc (see Otitis); and in obstinate catarrhal inflammation of the lining membrane, the discharge may often be checked by penciling the whole interior of the meatus with a solution of five grains of nitrate of silver in an ounce of water.

OTOSCOPE, n. *ŏt′ō-skōp* [Gr. *ōta*, the ears; *skopĕō*, I see or observe]: in *med.*, an instr. for exploring the ear.

OTOSTEALS, n. *ō-tŏs′tĕ-ălz* [Gr. *ōta*, the ears; *ostĕŏn*, a bone]: a term applied to the bones of the ear.

OTRANTO, Duke of: see Fouché, Joseph.

OTRANTO, *ō-trân′tō*, Terra di, now called Lecce: extreme s.e. province of Italy, forming the heel of the 'Italian boot;' bounded n.w. by the provinces of Bari and Basilicata, and surrounded on all other sides by the sea; 102 m. long, 25 to 35 m. broad; 3,293 sq. m. It occupies the ancient Iapygian or Messapian peninsula. Three-fourths of its surface are covered with hills, offsets from the Apennines of Basilicata. All the rivers are short, many of them being lost in the marshes of the interior; but abundant springs and heavy dews render the soil surprisingly fertile. Good pasture lands and dense forests occur. The climate is pleasant and healthful, except along the e. and w. coasts and in the vicinity of the marshes, which in summer generate malaria. An abundance of the best wine, with corn and olive-oil, are produced; tobacco (the best grown in Italy), cotton, and figs, almonds, oranges, etc., also are produced. The cap. is Lecce (q.v.). Pop. of O. (1881) 553,298; (1901) 706,520.

OTSEGO, *ŏt-sē′gō*, Lake: in Otsego co., N. Y.; about 7½ m. long by 1½ m. wide, 1,193 ft. above sea-level, and forms the source of the principal branch of the Susquehanna river. It is noted for the beauty of its scenery, the clearness of its waters, and the abundance of fish which it contains. Cooperstown, cap. of the co., is at the s. extremity near the outlet of the lake. It is a favorite summer resort. Pop. (1900) 125.

OTTAWA, *ŏt′ta-wa:* capital and principal city of La Salle co., Ill.; at the junction of the Fox and Illinois rivers, on the Chicago, Rock Island and Pacific and the Chicago, Burlington and Quincy railroads, and the Illinois and Michigan canals; 82 m. s.w. of Chicago. O. is the seat of St. Francis Xavier's College, and Pleasant View Lutheran College. The region is agriculturally

productive and extensive deposits of fire-clay, glass-sand, magnesium, building stone, and bituminous coal are being actively worked in the immediate vicinity. A large trade is done at O. in brick, tile and sewer-pipes, also in farm and dairy products. The industries of O. include glass, building tiles, terra cotta, crockery, pottery, drain-tiling, bricks, agricultural implements, wagons, pianos and organs, fire-pumps, silver-plated ware, and cigars. The public buildings include the Illinois Appellate Court building, Reyburn Memorial Hospital, Odd Fellows and other libraries and several city and county buildings. There are large school buildings, numerous churches, national and savings banks, newspapers and important business concerns. The city is well-kept and has an adequate supply of electric light and water. Both plants are owned and operated by the city. O. possesses a famous mineral spring, around which a beautiful park has been laid out. The water from this spring is reported to be equal in its medicinal qualities to the Springs of Saratoga. Pop. (1900) 10,588; (1910) 9,535.

OT'TAWA: city, cap. of Franklin co., Kan.; on the Missouri Pacific and Southern Kansas railroads, and on Marais des Cygnes river, 27 m. s. of Lawrence, 53 m. s.w. of Kansas City, Mo. It is the seat of Ottawa Univ. There are large Santa Fe railroad machine shops employing several hundred men; nurseries, carriage, furniture and soap factories, flour mills, creameries, and grain elevators. O. is in a large farming and dairy section. A big trade is carried on in live stock, dairy products, nursery stock, grain, wool and fruit. There is a Chautauqua Assembly at O., and the city has many churches and schools. Pop. (1900) 6,934; (1910) 7,650.

OT'TAWA: city, cap. of the Dominion of Canada, and of Carleton County, in the Province of Ontario; at the confluence of the Ottawa with the Rideau, 118 m. w. of Montreal, 450 from New York. It is on the Canadian Pacific, the Grand Trunk, and the New York and Ottawa (New York Central) railroads. Electric railways reach every section of the city and extend to all nearby suburbs. The city is in communication by steamer on the Ottawa with Montreal; on the Rideau canal with Lake Ontario at Kingston; and with the principal points of the province by the St. Lawrence and Ottawa.

Topography.—Hull, on the opposite bank of the river in the Province of Quebec, is one with O. in commercial and industrial matters but is separate in municipal government; and New Edinburgh, an eastern suburb, is the seat of the gov. gen. of Canada. The Rideau canal, which is a part of an inland system of navigation from Kingston through Rideau Lake, reaches the Ottawa river by a series of locks through the city, and divides the city into 'Upper and Lower Towns;' and the business part of the city, with the chief public buildings, lies on its w. side. At the w. end of the city, the Ottawa rushes over the magnificent cataract known as the Chaudière

Falls, 600 feet wide and 40 feet high. Some distance above these falls the Canadian Pacific bridge crosses the river; immediately below a road bridge spans the river and below this is a combined railway and road bridge. At the n. e. end there are two other cataracts, over which the Rideau falls into the Ottawa. In all 10 bridges cross the Rideau within the city limits. The scenery around O. is scarcely surpassed by any in Canada, and improvements are being made each year by the O. Commission which add to the beauty of the suburbs.

Industries.—O. is in the centre of a rich agricultural region and in the vicinity are to be found vast mineral deposits, mica, zinc, iron, asbestos, phosphate of lime, etc. The immense water-power of the falls is utilized by several saw-mills which turn out vast quantities of sawn timber and give to O. its principal trade. The available water-power in the immediate vicinity of O. is estimated at 200,000 horse-power, and within a radius of 45 m. there is a total of 1,000,000 horse-power. Other industries, include the manufacture of matches, pulp and paper wooden-ware, indurated fibre ware, foundries, machine shops, flour mills, brick and tile works, carriage and furniture factories, and railroad car and repair shops.

Government, Public Works, Finance, Etc.—A mayor and corporation administer public affairs. The city has a good system of arc and incandescent lights, an extensive electric railway system, water-works, sewerage system, and an effective fire department. The bonded debt of the city is $4,942,829, and the assessed value of real and personal property $26,000,000. There is property to the value of $17,000,000 which is exempt from taxation, the greater part of which belongs to the federal government and the balance to religious, charitable, educational and other institutions. Four daily, three semi-weekly and several monthly and fortnightly periodicals are published. The majority of the chartered banks of the country have branches in the city, which is also the headquarters of the Bank of Ottawa. There is also a postal savings bank.

Public Buildings, Churches, Etc.—The most important of the public buildings is the imposing group occupying about four acres on Parliament Hill 125 feet above the river—the Parliament and Government buildings. These are constructed of Canadian and Dominion sandstone and are built in the Italian Gothic style; the foundation-stone was laid by the Prince of Wales (now King Edward VII.) in 1860. The cost of the original buildings, including the library and the Victoria Tower, 180 feet high, was $8,000,000. Several other large buildings, notably the Langevin Block, are used as government offices. Other buildings include the Geological Museum and National Art Gallery, the Royal Mint, the post-office, city hall, public library, Rideau Hall, the Astronomical Observatory, and the National Archives. The churches include the Church of England and Roman Catholic cathedrals, and many fine edifices belonging to the Methodist, Baptist,

Presbyterian, Congregational, Reformed Episcopal, Lutheran and Catholic Apostolic denominations. There are numerous hospitals, orphanages, and homes for the aged and friendless.

Educational Institutions.—Separate systems of schools are maintained under the laws of the Province for Catholics and Protestants. The chief educational institutions are the University of Ottawa (R. C.), the Provincial Normal School, affiliated with Toronto University, the Model School, Collegiate Institute, Ladies' College, Saint Joseph's College, and a number of special schools in charge of the Oblate Fathers, three theological schools, and a number of private academies. The largest library in the city is the library of Parliament which contains about 200,000 volumes. A good collection of Canadian books is to be found in the Archives Library, and a new Carnegie Library has recently been opened.

History.—It was not until the latter part of the 18th century that a permanent settlement was made on the site of the present city. Philemon Wright, of Boston, Mass., built the first house on the Hull side of the river and later acquired some property on the south side which he subsequently transferred to one Nicholas Sparks in payment for labor. The city was originally called Bytown, after Col. By, who 1827 was commissioned to construct the Rideau canal; it was incorporated as a city, and received its present name 1854. In 1858 O. was chosen to be the seat of govt. of the then province of Canada; and 1860 the Prince of Wales laid the corner-stone of the magnificent parliamentary offices, but the first Dominion Parliament was not held here until 1868. On 1900, April 26, Hull and a large part of O. were destroyed by fire, the loss being over $15,000,000. The history of this city in recent times is one of advancement in industrial, commercial and other pursuits. Pop. (1881) 27,412; (1891) 44,154; (1901) 59,928; (1907) about 65,000.

OTTAWA, *ŏt'ta-wa*, River: one of the large rivers of British N. America. It rises in lat. 40° 30′ n., long. 76° w., in the watershed on the opposite side of which rise the St. Maurice and Saguenay. After a course of more than 600 m., it falls into the St. Lawrence by two mouths, which form the island of Montreal: the entire region drained by it and its tributaries is estimated at 80,000 sq. m. In some places its width contracts to 125 or 150 ft.; elsewhere it widens into numerous lakes of considerable size. It is fed by many important tributaries, such as the Mattawa, Missinnippi, Madawasca, and Rideau on the right, the Gatineau and the Rivières du Moine and du Lièvre on the left side. These, with the O. itself, give transit for perhaps the largest lumber trade in the world, while the clearances of the lumberer have opened the country for several thriving agricultural settlements. The O. is connected with Lake Ontario at Kingston by the Rideau canal.

OTTAWA.

1. Parliament Buildings—Front.
2. The City from the Parliament Buildings.

OTTAWA UNIVERSITY.

OTTAWA, University of: conducted by the Oblate Fathers of Mary Immaculate, was established in 1848. Originally incorporated under the title of 'College of Bytown,' this institution received, in 1866, the title of 'College of Ottawa,' together with the power of conferring University Degrees. In 1883 its charter was so amended as to extend its original powers. Besides the regular university degrees, the University of Ottawa enjoys the right of conferring the Degrees of Bachelor and Doctor in Science and Music, together with the degrees of Civil Engineering, Mining Engineering and Mechanical Engineering. By a brief, dated 5 Feb. 1889, the Sovereign Pontiff, Leo XIII., raised the University of Ottawa to the rank of a Catholic University.

The programme of studies embraces six distinct courses. (1) The Theological Course, which extends over four years and embraces all the branches of ecclesiastical science generally taught in Catholic seminaries. (2) The Philosophical Course. (3) The Course of Arts, which extends over four years, at the end of which the student may receive the diploma of Bachelor of Arts or Bachelor of Literature. (4) The Scientific Course, commencing after the Collegiate Course, and lasting three years. After the necessary examination students may receive the degree of B.S. (5) The Collegiate Course. (6) The Commercial Course.

The University library, destroyed by the great fire of 2 Dec. 1903, has been partially restored and consists of 5,000 volumes. The number of students attending all departments is 460. These are recruited all over the Dominion, 15 in the United States and Newfoundland.

Since Ottawa has immense water-power at its command, and is situated in the vicinity of vast tracts of unclaimed mineral, it offers unexampled opportunities for a school of practical science giving courses in engineering. The University authorities have erected a four story building for the department of applied science.

OTTAWA UNIVERSITY, founded in 1865 at Ottawa, Kan. It was incorporated under the joint control of the Baptists and the Ottawa Indians; the legislature set apart 20,000 acres from the Indians' reservation for the University, with the provision that two of the six trustees should be Indians. This arrangement did not prove entirely satisfactory, and in 1873 an adjustment was made that placed the University entirely under the control of the Baptist denomination. There is a preparatory department, and in addition to the regular college instruction, there are courses in pedagogy and business. The college work is arranged in three courses, classical, scientific and philosophical, leading to the three degrees of A.B., B.S., and Ph.B. All courses are open to women. The library in 1906 contained 4,400 volumes; the productive funds amounted to $151,294, and the annual income was $20,020. The students (1906) numbered 480, and the faculty 20.

OTTAWAS, *ŏt'ta-waz:* one of the tribes of American Indians of the Algonquin stock. When the French first explored the region, the O. were settled on the n.w. portion of Mich. and on the Manitoulin islands. There were three divisions of the tribe, the Kiskakons, Sinagos, and Keinouches. They worshiped three gods, Michabou, the creator of the earth; Missabizi, 'the great tiger;' and Mirabichi, god of the waters. After the power of the Hurons was destroyed by the Iroquois 1649, that portion of the tribe living at Saginaw, Thunder Bay, and on the Manitoulin islands joined the Sioux in their home beyond the Mississippi. They soon quarrelled with the Sioux, whom they left, and settled at Mackinaw. Here they had trouble with the Iroquois, and allied themselves with the French. When Detroit was settled, part of the O. located in the vicinity and the Mackinaw settlement was removed to Arbre Croche. In the struggle for the possession of Canada the tribe aided the French; and at its close Pontiac, chief of the Detroit portion, conspired to massacre the English garrisons and destroy the English power in all that region (see PONTIAC). The Arbre Croche branch did not take part in this outrage. The O. were allies of the English in the revolution. By various treaties they have ceded lands to the United States. They divided into several bands and mingled with other tribes. One of the branches settled in Kan., and its members became citizens, but removed 1870 to a reservation in the Indian Terr. where 1885 they owned 14,860 acres of land. Their number had become reduced to 115. The Michigan O. have reservations in that state, near the Chippewas, and are civilized and industrious. The Canadian O. are located on various islands, and are peaceful and prosperous.

OTTENDORFER, *ŏt'tĕn-dorf-ĕr*, OSWALD: born Zwittau, Moravia, 1826, Feb. 26. After obtaining a classical education, he studied law at the University of Vienna, engaged in an uprising against the govt., fled to Saxony and took part in another attempt at revolution; came to New York, where he was engaged in the business dept. of the *Staats-Zeitung*, and 1859 married Mrs. Uhl, widow of the former proprietor. Under his management the paper greatly increased in circulation and influence. It has favored civil-service reform and advocated various improvements in the management of public schools. O. was an alderman 1872–74, and in the latter year was the anti-Tammany candidate for mayor, and was defeated. He gave $300,000 to establish and maintain a school in his native town, established a free library in New York, and at a cost of about $600,000 built the New Isabella Heimath, a home for aged indigent women, opened 1889, Nov., at 190th st. and Tenth avenue, New York. Died December 16, 1900.

OTTER, n. *ŏt'tĕr* [Ger. *otter;* Icel. *ottr*, an otter: F. *loutre*—from L. *lutra*, an otter], (*Lutra*): genus of quadrupeds of the Weasel family (*Mustelidæ*), differing widely from the rest of the family in their aquatic habits and in a conformation adapted to these habits, and in some respects approaching that of seals. The body, long and flexible, as in the other *Mustelidæ*, is considerably flattened; the head is broad and flat; the eyes are small, and furnished with a *nictitating membrane;* the ears are very small; the legs are short and powerful; the feet, which have each five toes, are completely webbed; the claws are not retractile; the tail is stout and muscular at its base, long, tapering, and horizontally flattened; the dentition is very similar to that of weasels; six incisors and two canine teeth in each jaw, with five molars on each side in the upper, and five or six in the lower jaw; the teeth very strong, and the tubercles of the molars very pointed, an evident adaptation for seizing and holding slippery prey. The tongue is rough, but not so much so as in the weasels. The fur is very smooth, and consists of two kinds of hair—an inner fur very dense and soft, intermixed with longer, coarser, and glossy hair. The species are numerous, both in warm and in cold climates.—The COMMON O. (*L. vulgaris*) is a well-known British animal, common also throughout Europe and in parts of Asia. It often attains a weight of 20 to 24 lbs. The size varies much, but the average length is fully 2 ft., exclusive of the tail, which is about 16 inches long. The color is a bright rich brown on the upper parts and the outside of the legs, being the color of the tips of the long hairs, which are gray at the base; the tips of the hairs in the soft inner fur also are brown, the base is whitish-gray; the throat, cheeks, breast, belly, and inner parts of the legs are brownish-gray, sometimes whitish; and individuals sometimes, but rarely, occur with whitish spots over the whole body; the whiskers are very thick and strong; the eyes are black. The O. frequents rivers and lakes, inhabiting some hole in their banks, generally choosing one which already exists, and seldom, if ever, burrowing for itself. It also inhabits the sea-shore in many places, and swims to a considerable distance from the shore in pursuit of prey. Its movements in the water are extremely graceful; it swims with great rapidity in a nearly horizontal position, and turns and dives with wonderful agility. Its prey consists chiefly of fish, and, like the other *Mustelidæ*, it seems to take pleasure in pursuing and killing far more than it is able to eat; and in this case it daintily feeds on the choicest part, beginning behind the head of the fish, and leaving the head and often much of the tail part. The O., however, when fish cannot readily be obtained, satisfies the cravings of hunger with other food, even snails and worms, and attacks small animals of any kind, sometimes making depredations in places far from any considerable stream. The O. produces two to five young ones at a birth. The

flesh of the O. has a rank fishy taste, on which account, perhaps, it is sometimes used in the Rom. Cath. Church, as *fish*, by those whose rules forbid them the use of flesh.—O. hunting has long been practiced in Britain, though now confined chiefly to Wales and Scotland. Hounds of a particular breed—O. Hounds—are preferred for it.—The O. defends itself with great vigor against

Otter (*Lutra vulgaris*).

assailants. It can be easily domesticated, and trained to catch fish for its master. In India, tame otters—probably, however, of another species (noticed below)—are frequently used both for catching fish, which they bring ashore in their teeth, and for driving shoals of fish into nets.—The fur of the O. is in some request, but more on the continent of Europe than in Britain.—The AMERICAN O. or CANADA O. (*L. Canadensis*) is very like the Common O., but considerably larger. The tail is shorter, and the fur of the belly is almost of the same shining brown color with that of the back. This species is plentiful in the N. parts of N. America. Its skin is a considerable article of commerce, and after being imported into England, is often exported again to the continent of Europe. It is usually taken by a steel-trap, placed at the mouth of its burrow, and its pursuit forms a systematic occupation. Its habits are very similar to those of the O. of Europe.—The INDIAN O. (*L. Nair*), has a deep chestnut-colored fur, and yellowish-white spots above the eyes. —The Brazilian O. (*L. Braziliensis*) is said to be gregarious.—Somewhat different from the true otters is the SEA O. or KALAN (*L. marina*, or *Enhydra lutris*), an animal twice the size of the Common O., native of Behring's Straits and the neighboring regions, frequenting sea-washed rocks. There are, at least in the adult, only four incisors in the lower jaw, and the ears are set lower in the head than in the true otters, below, not above, the eyes. The tail is much shorter. The molar teeth are broad, and well adapted for breaking the shells of mollusks and crustaceans. The hind-feet have a membrane skirting the outside of the exterior toes. The sea O. is much valued for its fur, the general hue of which is a

rich black, tinged with brown above, and passing into lighter colors below. The head is sometimes almost white. The skins of sea otters were formerly in very great request in China, so that a price of $175 to $250 could be obtained for each; but the attention of European traders and hunters having been directed to them —chiefly by a passage in *Cook's Voyages*—they were carried to China in such numbers as greatly to reduce the price.

OTTERBEIN, *ŏt'ĕr-bīn*, PHILIP WILLIAM: founder of the Church of the United Brethren in Christ: 1726, June 3—1813, Nov. 17; b. at Dillenburg, in Nassau, Germany; of a family noted for producing a large number of ministers and teachers. He was educated at the Ger. Reformed Acad. at Herborn—the course of study comprising Greek, Latin, Hebrew, philosophy, and theology; and afterward he was four years a teacher in the same school. He was ordained in the Ger. Reformed Chh., at Dillenburg, 1749, June 13; and 1752 he was sent as missionary to his countrymen who had settled in America, responding to a call from the Rev. Michael Schlatter, the pioneer laborer among the German Reformed in America, who was acting under the direction of the synods of N. and S. Holland. O. served successively congregations at Lancaster, Penn., Tulpehocken, Penn., Frederick, Md., York, Penn., and Baltimore, Md. During his Lancaster ministry, he reached a marked and new evangelical experience; and from that time his preaching had new fervor and power. His introduction of prayer meetings, his training laymen to conduct meetings, his zeal and 'new measures,' excited much opposition among the conservative members of the Ger. Reformed Church. About 1766 he met at a 'great meeting' the Rev. Martin Boehm, a devout Mennonite, whose religious experience was similar to his own. After listening to a fervent sermon by Mr. Boehm, O. arose and clasped him in his arms, exclaiming, with manifest emotion, 'We are brethren.' In 1774 O. went to Baltimore and became pastor of an independent congregation, laboring there with great success till his death. His labors as an evangelist among the Germans during his later years were fruitful in a large degree. He was an intimate friend of the Rev. Francis Asbury (q.v.), and was chosen to assist in his ordination as bishop.

O., though never formally severing his connection with the church into whose ministry he had been ordained, and though reluctant to organize his followers into a separate denomination, yet finding that the circumstances required organization to perpetuate the great work of his life, joined with Martin Boehm in calling a conference 1800, Sep. 25, at which he and Mr. Boehm were chosen bishops. In scholarship, broad sympathy with his fellow-men, and fervent piety, he was well qualified to be the founder of the great religious movement with which his name is so honorably associated. See UNITED BRETHREN IN CHRIST.

OT'TERBEIN UNIVER'SITY: institution of learning at Westerville, O.; oldest and most noted educational institution of the Church of the United Brethren in Christ. It was founded 1847, and named in honor of Bp. Philip William Otterbein, founder of the church. The policy of co-education was adopted, and the school opened 1847, Sep. 1, under the presidency of W. R. Griffith; during the first year, it had 81 students. In 1849 the institution was regularly chartered, and the Rev. William Davis was elected pres., being succeeded, after one year, by the Rev. Lewis Davis, who served till 1857, when he resigned, to accept the bishop's office. After various presiding officers, H. A. Thompson, D.D., became pres., 1872-86; succeeded by Henry Garst, D.D., who resigned 1889. The same year the Hon. Charles A. Bowersox, an alumnus of the institution and a lawyer, was called to the president's chair. The original buildings consisted of a chapel and recitation-rooms, and a dormitory for young ladies. In 1854 a dormitory for young men was built, the funds for the building being contributed mostly by Mr. Jacob Saum. In 1855 a main building was erected, at a cost of $40,000. In 1870 this building, with all its contents, was destroyed by fire, involving a loss of $50,000. The following year a commodious and well-appointed building, costing $45,000, was erected. The institution has an endowment of $100,000. There are 24 members in its faculty, with 475 students. The aggregate attendance of students has been nearly 12,000 during its history, of whom 717 have been graduated. The university has a library of 11,500 vols. The courses of study leading to degrees conform to the standard of the Ohio College Assoc., requiring three years in preparation.

OT'TERBURN, Battle of. See Chevy Chase.

OTTER-SHREW: a very large South African aquatic shrew, which has a strange resemblance in appearance and habits to an otter.

OTTO, *ŏt'ō*, Louis William, Count of Mosloy: 1754-1817, Nov. 9; b. Baden, Germany. He studied at the Univ. of Strasbourg, came to the United States 1779 in the diplomatic service of the French govt., and remained about three years. He sympathized with the Girondists 1793, and assisted the committee of public safety. On the overthrow of the party, he was imprisoned, but obtained his liberty on the fall of Robespierre. He was afterward in diplomatic service at Berlin, London, and Vienna; arranged the marriage of Napoleon with Maria Louisa, and was for a short time minister of state. His wife was an American lady named Livingston. He died at Paris.

OTTOMAN, a. *ŏt'tō-măn* [a name of the Turkish empire—from *Othman*, its founder]: term designating anything that pertains to the Turks or their government: N. kind of sofa; stool having a stuffed bottom; reclining or easy seat.

OTTOMAN EMPIRE, or 'EMPIRE OF THE OSMANLIS': empire comprehending all the countries more or less under the authority of the Turkish sultan; including, besides Turkey in Asia, and that part of Turkey in Europe under his immediate sovereignty, the tributary but autonomous principality of Bulgaria, with the autonomous province of Eastern Roumelia, in Europe (Roumania, Servia, and Montenegro being now independent); Egypt (nominally) and Tripoli, in Africa; and a part of Arabia, including Mecca and Medina, in Asia. For the description, topography, and statistics of TURKEY, see that title. Here is presented a sketch of the origin and history of the Ottoman Empire.

The Ottomans, or Osmanlis, to whom the generic epithet of *Turks* is by common usage now confined, are descendants of the Ogûzian Turks, a tribe of the great Turkish nation, which in the 13th c. inhabited the steppes e. of the Caspian Sea. The tide of Mongol invasion then setting in from the n.e., swept the Ogûzes before it, and they, to the number of 50,000, under their chief, Suliman, fled w. to the mountainous region of Armenia. After the chief's death, the majority of the tribe became scattered over Mesopotamia; but a few thousands under Orthoguel, his youngest son, marched westward to aid the Seljuk sultan of Konieh against the Khaurezmians and Mongols, and received from the grateful monarch a grant of land in Phrygia.—His son, OTHMAN (q.v.) (ruled 1289–1326), laid the foundation of the independent power of the Turks; and Othman's son and successor, ORKHAN (ruled 1326–59) continued his aggressive policy, and gained a footing in Europe by the taking of Gallipoli, Koiridicastron, and other fortresses on the coast. The Greeks, with the usual contempt of civilization for barbarism, made light of these losses, saying that the Turks had only taken from them a 'hog's sty' and a 'pottle of wine,' in allusion to the magazines and cellars built by Justinian at Gallipoli; but, as the historian Knolles quaintly remarks, 'by taking of such hogsties and pottles of wine, the Turks had gone so far into Thracia, that Amurath, a few years later, placed his royal seat at Adrianople.' Sultan Orkhan, perceiving the advantage of possessing a force trained exclusively for war, organized the body of troops known as Janizaries (q.v.), and to these his successor added the Spahis (q.v.) and the Zanis.—AMURATH I. (ruled 1359–90), successor of Orkhan, rapidly reduced the Byzantine empire within the limits of Constantinople and some neighboring districts in Thrace and Bulgaria. A formidable confederacy of the Slavonian tribes of the Upper Danube was formed against him, and supported by multitudes of warriors from Hungary and Italy, they advanced into Servia to give him battle; but their army, amounting, it is said, to 500,000 men, was defeated with dreadful slaughter at Kossova (1390); and though the sultan was assassinated on the eve of the battle, his son, BAJAZET I. (q.v.) (ruled 1390–1402), followed up this victory by rav

aging Servia and Walachia. Moldavia also was overrun, and a second crusading army, under the king of Hungary, totally routed at Nicopolis (1396); but the defeat and capture of the sultan by Timur (q.v.), gave Constantinople respite for half a century, by raising up numerous claimants for the Turkish throne; and it was not till 1413 that Bajazet's youngest son, MOHAMMED I. (ruled 1413–22), established his claim to the sceptre. A war which broke out with the Venetian republic at this time produced the most disastrous consequences to the mercantile and maritime interests of the Turks, and internal disorders prevented any aggressions on their neighbors.—AMURATH II. (ruled 1422–50), a prince of considerable ability, completed the conquest of the Greek empire by reducing Macedonia and Greece Proper; and finding that the Hungarians had concluded a secret treaty of offense and defense with the Turkish sultan of Caramania against him, he attacked the Hungarians, but was defeated by Hunyady (q.v.), and compelled to retreat. Disheartened at his ill success, he resigned the throne; but receiving news of a formidable invasion by the army of the papal crusade, resumed the direction of affairs, and totally defeated the invaders, with whom were Hunyady (q.v.) and Scanderbeg (q.v.), at Varna (1444).—MOHAMMED II. (q.v.) (ruled 1450–81), sworn foe of Christianity, greatly enlarged the Turkish territories. It was he who stormed Constantinople 1453, and destroyed the last relic of the empire of the Cæsars.—His son, BAJAZET II. (ruled 1481–1512), extended his dominions to the present limits of the Turkish empire in Asia and Europe, including, however, also the country n. of the Black Sea, as far e. as the mouth of the Don, portions of Dalmatia, and Otranto in Italy. Bajazet was the first to feel the evil effects of the military organization of the Janizaries by Sultan Orkhan, but all his attempts at riddance of his formidable soldiery were unsuccessful. He attempted the invasion of Egypt, but was totally defeated by the Mameluke sultan at Arbela (1493).—His successors, SELIM I. (q.v.) (ruled 1512–20), and SOLYMAN I. (q.v.) (ruled 1520–66), raised the O. E. to the height of its power and splendor. During their reigns, no ship belonging to a nation hostile to the Turks dared navigate the Mediterranean, so completely did their fleets command that sea.—SELIM II. (ruled 1566–74), a pacific prince, put an end to a war with Austria, begun in the previous reign, by a peace in which it was stipulated that Emperor Maximilian II. should pay a tribute of 30,000 ducats annually for the possession of Hungary, and that each nation should retain its conquests. During his reign, occurred the first collision of the Turks with the Russians. It had occurred to Selim, that the connection of the Don and Volga by a canal would, by allowing the passage of ships from the Black Sea into the Caspian, be a valuable aid to both military and commercial enterprise; accordingly he sent 5,000 workmen to cut the canal, and an army of 80,000 men to aid and

protect them. But, unluckily, the possession of Astrakhan formed part of the program, and the attack of this town brought down on the Turks the wrath of the Russians, a people till then unknown in s. Europe, and the projected canal-scheme was checked at the start. The rest of this sultan's reign was occupied in petty wars with Venice, Spain, and his rebellious feudatory of Moldavia.—His son, AMURATH III. (ruled 1574–95), such was then the prestige of the Turks, dictated to the Poles that they should choose as their king, Stephen Bathory, Woiwode of Transylvania; and received the first English embassy to Turkey 1589, the object of the embassy being to conclude an alliance against Philip II. of Spain. To this the sultan agreed; but the destruction of the Spanish Armada soon afterward rendered his interference unnecessary. After an exhausting, though successful war with Persia, succeeded a long contest with Austria, in which the Turks at first obtained brilliant success, penetrating to within 40 m. of Vienna, but afterward suffered such terrible reverses, that they were compelled to evacuate all Hungary and Transylvania (hitherto a feudatory), and were saved from destruction only by the Poles, who, entering Moldavia, and driving out the Transylvanians and Hungarians, afforded the Turks an opportunity of rallying, and even recovering some of their losses. The latter part of this war was during the reign of MOHAMMED III. (ruled 1595–1604), and afforded unmistakable symptoms of the decline of Turkish prowess; and a rebellion of the Pasha of Caramania, in Asia, quelled not as Mohammed II. or Bajazet I. would have quelled it, but by yielding to the pasha's demands, afforded convincing proof of the growing weakness of the central administration, and set an example to all ambitious subjects in future. During the reigns of ACHMET I. (ruled 1604–17), MUSTAFA (ruled 1617–17; 1622–3), OTHMAN II. (ruled 1617–22), and AMURATH IV. (ruled 1623–40), Turkey was convulsed by internal dissensions; nevertheless, a successful war was waged with Austria for possession of Hungary; but this success was more than counterbalanced in the East, where Shah Abbas the Great conquered Mesopotamia, Kurdistan, and Armenia; and in the north, where the Poles took possession of some frontier fortresses. While Amurath was recovering his lost provinces in the East, the khan of the Crimea, countenanced by the Poles and Russians, threw off his allegiance. Mustafa, grand vizier, a man of great ability and integrity, continued at the helm of government under IBRAHIM (ruled 1640–48); took from the Poles their conquests; and in a war with the Venetians (1645), obtained Candia and almost all the Venetian strongholds in the Ægean Sea, though with the loss of some towns in Dalmatia.—MOHAMMED IV. (ruled 1648–87) commenced his reign in most unfavorable circumstances; he was only seven years of age, and the whole power was vested in the Janizaries and their partisans, who used it to accomplish

their own ends; but luckily for Turkey, an individual of obscure birth, Mohammed Köprili, supposed to be of French descent, was, when more than 70 years of age, appointed vizier; and the extraordinary talents of this man were the salvation of Turkey at this critical juncture. He was succeeded (1661) in office by his son Achmet, a man of equal ability, and under his guidance the central administration recovered its control over even the most distant provinces; a formidable war with Germany, though unsuccessful in the field (1663), was concluded by a peace advantageous to the Turks; Crete was wholly subdued, and Podolia wrested from the Poles; though, shortly afterward, much of this last acquisition was reconquered by John Sobieski (q.v.). Achmet's successor overran the Austrian territories, and laid siege to Vienna; but the siege was raised, and his army defeated, by a combined army under Duke Charles of Lorraine, and John Sobieski, King of Poland. The Austrians followed up this victory by repossessing themselves of Hungary, inflicting on the Turks a bloody defeat at Mohacz (1687); but the fortunate appointment of a third Köprili as grand vizier by SOLYMAN II. (ruled 1687–91), was the means of restoring glory and fortune to the Turkish arms.—The reigns of ACHMET II. (ruled 1691–95), and MUSTAFA II. (ruled 1695–1702), were occupied with wars against Austria; but with the death of Köprili (1691) fortune deserted the Turks, and the peace of Carlowitz (1699) forever put an end to Turkish domination in Hungary.—ACHMET III. (ruled 1702–30) was forced by the intrigues of Charles XII. (q.v.) of Sweden, while residing at Bender, into a war with Russia; which was immediately followed by an invasion of Moldavia by Czar Peter. The czar, imprudently relying on the aid of the Woiwode of Moldavia, found himself in great straits, from which he was rescued by the genius of his queen, afterward Catharine I. The recovery of the Morea from the Venetians, and the loss of Belgrade and parts of Servia and Walachia, which were, however, recovered during the subsequent reign of MAHMUD I. (ruled 1730–54), and the commencement of a long war with Persia (see NADIR SHAH), were the other prominent occurrences of Achmet's reign. In 1736, the career of Russian aggression commenced with the seizing of Azof, Oczakof, and other important fortresses; but a scheme for the partition of Turkey between Austria and Russia was foiled by the continued series of disgraceful defeats inflicted on the Austrian armies by the Turks: the Russians, on the other hand, were uniformly successful; but the czarina becoming very desirous of peace, resigned her conquests in Moldavia, and concluded a treaty at Belgrade. Among the benefits conferred by Sultan Mahmud on his subjects, not the least was the introduction of the art of printing.—His successor, OTHMAN III. (ruled 1754–57), soon gave place to MUSTAFA III. (ruled 1757–74), under whom the empire had profound tranquillity; but after his death, the Russians, in violation of the

treaty of Belgrade, invaded Moldavia.—The war with Russia continued during the succeeding reign of ABDUL-HAMID (ruled 1774–89); the fortresses on the Danube fell; and the main army of the Turks was totally defeated at Shumla. The campaign was ended 1774, July 10, by the celebrated treaty of Kutshouk-Kainardji. In defiance of its provisions, the czarina took possession of the Crimea and the whole country eastward to the Caspian. The sultan was compelled, by his indignant subjects, to take up arms 1787. In 1788 Austria made another foolish attempt to arrange with Russia a partition of Turkey; but, as before, the Austrian forces were completely routed. The Russians, however, with their usual success, had overrun the n. provinces, taken all the principal fortresses, and captured or destroyed the Turkish fleet.—The accession of SELIM III. (q.v.) (ruled 1789–1807) was inaugurated by renewed vigor in the prosecution of the war; but the Austrians had again joined the Russians. Belgrade surrendered to the Austrians; while the Russians took Bucharest, Bender, Akerman, and Ismail (see SUVOROF); but the critical aspect of affairs in w. Europe made it advisable for Russia to terminate the war, and a treaty of peace was accordingly signed at Jassy, 1792, Jan. 9. By this treaty the provisions of that of Kainardji were confirmed; the Dniester was made the boundary-line, the cession of the Crimea and the Kuban was confirmed, and Belgrade was restored to the sultan. Numberless reforms were then projected for better administration of the empire. The people were, however, unprepared for so many changes, and the sultan's projects cost him his throne and life. The occupation of Egypt by the French brought on a war between them and the Turks, in which the Turks, by aid of the British, were successful in regaining their lost territories. In revenge for the defeat of his Egyptian expedition, Napoleon contrived to entrap the sultan into a war with Russia and Britian, which was confined to a struggle in Egypt, in which the British were worsted.—After the ephemeral reign of MUSTAFA IV. (ruled 1807–8), the able and energetic MAHMUD II. (q.v.) (ruled 1808–39) ascended the throne; and though his dominions were curtailed by the loss of Greece, which established its independence, and of the country between the Dniester and the Pruth, which, by the treaty of Bucharest in 1812, was surrendered to Russia, the reformation that he effected in all departments of administration checked the decline of the O. E. Egypt, during his reign, attempted unsuccessfully to throw off the authority of the sultan (see MEHEMET ALI: IBRAHIM PASHA).—His son, ABDUL-MEDJID (ruled 1839–61), continued the reforms commenced in the previous reign; but the czar, thinking that the dissolution of the O. E. was at hand, constantly tried to wring from the sultan some acknowledgement of a right of interference with the internal affairs of the country. It was an attempt

of this sort to obtain the exclusive protectorate of the members of the Greek Church in Turkey, that brought on the Crimean war of 1853–55, in which the Turks were effectively supported by England, France, and Sardinia. The treaty of Paris (1856) restored to Turkey the command of both sides of the lower Danube, excluded the czar from his assumed protectorate over the Danubian principalities, and closed the Black Sea against all ships of war. The Porte, apparently adopted into the family of European nations, made proclamation of equal civil rights to all the races and creeds of the Turkish dominions. But a massacre of Christians in Lebanon and at Damascus provoked western intervention 1860.—Abdul-Medjid, whose last years were disgraced by irrational profuseness of expenditure, was succeeded by his brother ABDUL-AZIZ 1861. Meanwhile the nominally subject peoples of Moldavia and Walachia ventured to unite themselves into the one state of Roumania; and 1866, the Empire, becoming more and more enfeebled through its corrupt administration, had to look on while the Roumanians expelled their ruler, and, in the hope of securing western support, chose Prince Charles of Hohenzollern hereditary prince (*domnu*) of the united principalities. The rebellion of Crete 1866 threatened a severe blow to the integrity of the empire, but was ultimately suppressed 1868—in spite of active help from Greece. Servia, already autonomous within her own frontiers, demanded the removal of the Turkish garrisons still maintained in certain Servian fortresses; and 1867 Turkey found herself compelled to make this concession. In the same year the sultan distinguished the Vali of Egypt by granting him the unique title of Khedive (q.v.). The vassal king drew down the wrath of his suzerain 1870 by negotiating directly with foreign courts, and was compelled to give formal tokens of vassalage. But later concessions have made the Khedive virtually an independent sovereign. The Russian govt. took the opportunity of war between Germany and France to declare, 1871, that it felt itself no longer bound by that provision of the Paris treaty which forbade Russia to have a fleet in the Black Sea; and a London conference sanctioned this stroke of Russian diplomacy. Between 1854 and 71 the Turkish debt had increased by more than $563,000,000; and 1875 the Porte was driven to partial repudiation of its debts. An insurrection in Herzegovina in the latter part of 1874 marked the beginning of a very eventful and critical period in the history of the O. E. The insurrection smouldered on through 1875 and part of 1876, and excited all the neighboring Slavonic peoples. A threatened revolt in Bulgaria 1875, May, was repressed with much bloodshed; and the merciless cruelty displayed by the Bashi-Bazouks or Turkish irregulars alienated foreign sympathy from the government.—1875, May, Abdul-Aziz was deposed; and his nephew, MURAD V., son of Abdul-Medjid, who succeeded him, was compelled in turn to make way for his

brother ABDUL-HAMID II. in Aug. of the same year. In June Servia declared war, and Montenegro followed her example. Before the end of the year the Servians were utterly defeated, in spite of the help of many Russian volunteers; but the state of affairs in the Turkish provinces seemed to call for a conference of the great powers at Constantinople. The proposals then made for the better government of the Christian subjects of Turkey were rejected by the Turkish authorities, who had, during the conference, taken the extraordinary step of bestowing a parliamentary constitution on the O. E. Russia took upon herself to enforce on Turkey the suggestions of the conference, and declared war, 1877, Apr. 24. Both in Armenia and in Bulgaria the opening of the campaign was favorable to Russian arms; but later the Turks rallied and seriously checked the hitherto triumphant progress of the invaders. Even after the Russian forces had been greatly augmented, the Turks resisted energetically. Kars, besieged for several months, resisted till the middle of Nov; Erzeroum did not surrender until after the armistice had been concluded. Osman Pasha, who established himself in Plevna early in July, repelled with brilliant success repeated and determined assaults from a besieging army of Russians and Roumanians; and he so strengthened the fortifications as to be able to hold out until Dec. 10 , when he surrendered. Desperate fighting in the Shipka Pass had failed to expel the Russians from their position in the Balkans; and within a month of the fall of Plevna, the Russians captured the whole Turkish army guarding the Shipka Pass, and then easily overran Roumelia. The victorious Muscovites occupied Adrianople 1878, Jan., in menacing proximity to Constantinople; on the last day of that month an armistice was concluded; and in March the 'preliminary treaty' of San Stefano was signed. After grave diplomatic difficulties, owing chiefly to the apparent incompatibility of English and Russian interests, a congress of the powers met at Berlin, and sanctioned the cessions and other territorial changes which, with modifications, were carried out 1878-81. For these and later events, see TURKEY.

OTTO OF ROSES, *ŏt'tō*, correctly AT'TAR (q.v.): the volatile oil or otto (see PERFUMERY) of the petals of some species of rose, obtained by distillation, and highly prized as perfume. It is a nearly colorless or light yellow crystalline solid, at temperatures below 80° F., liquefying a little above that temperature. It is imported from the East, where in Syria, Persia, India, and Turkey, roses are cultivated to a considerable extent for its sake. It is probable that the oriental O. is the product of more than one species of rose; and it is uncertain what species is cultivated in some of the localities most famed for it; but *Rosa Damascena* is known to be so employed in n. India, and a kind of O. is sometimes obtained by the makers of rose-water from *Rosa centifolia* in England: see ROSE. Ghazipore, near Benares, is famous for its rose-gardens, which surround the town, and are in reality fields occupied by rows of low rose-bushes, which in the flowering season are red with blossoms in the morning, but the blossoms all are gathered before midday. Cashmere is noted for extensive manufacture of O., as are also the neighborhoods of Shiraz and Damascus. To procure the O., the rose-petals are usually distilled with about twice their weight of water, and the product exposed to the cool night-air in open vessels, from which the thin film of O. is skimmed with a feather in the morning. 20,000 flowers are required to yield O. equal to the weight of one rupee, which even in India is worth about 100 rupees, or about $50. O. is said to have been procured first by an accidental distillation of rose-petals exposed with water to the heat of the sun, and to have been found floating on the surface of the water; and it is still sometimes so obtained in India. It is said to be obtained also by dry distillation of rose-petals at a low temperature. During the distillation of rose-petals, a small quantity of a solid volatile oil comes over (Solid Oil of Roses, see below), which crystallizes and floats on the water in the receiver, and which is sometimes called *English Oil of Roses*. O. is frequently adulterated with sandalwood oil, oil of rhodium, etc. It is much used for making hair-oil, a drop of it imparting a pleasant odor to a considerable quantity. It is used also in making lavender-water and other perfumes. The odor of O. itself is too powerful to be altogether pleasant. For another method of obtaining the *scent* of roses, see PERFUMERY. O. is a mixture of two volatile or essential oils; the one solid at ordinary temperatures, and the other liquid. The solid oil of roses (rose camphor, stéaroptène of oil of roses) has very little odor. The liquid oil of roses (eléoptène of oil of roses) is a very fragrant liquid. The O. may be regarded as a solution of one part of the solid oil in two parts of the liquid. A good receipt for oil for the hair is olive oil, scented by a few drops of O., and this is generally sold under the name otto of roses. Medicines are occasionally perfumed by O., and it is sometimes added to unguents and spirit-washes.

OTTUMWA, *ŏt-tŭm'wa:* city, cap. of Wapello co., Io.; on the Des Moines river, and on the Chicago Burlington and Quincy, the Keokuk and Des Moines branch of the Chicago Rock Island and Pacific, the Kansas City branch of the Chicago Milwaukee and St. Paul, the Ottumwa and Kirkville, and the Wabash railroads, 75 m. n.w. of Burlington. The first settlement was on the banks of the river, but with the growth of the city the bluffs upon each side, 150 ft. in height, have been utilized for building sites. There are 15 churches; 6 public-school buildings which cost $180,000, a normal school, business college, and a Rom. Cath. acad.; 2 daily and 6 weekly papers; 3 national banks (cap. $260,000), and 2 state banks (cap. $100,000); 2 opera-houses; and 6 hotels. The city extends about 3 m. along the river, has 25 m. of sidewalks; 2 m. of paved and 7 m. of graded streets; a fine system of water-works; 5 m. of sewers; a steam heating plant; several miles of electric railroad; gas and electric lights; fire department; and excellent telephone service. Bricks are made in the vicinity, and fine qualities of limestone and sandstone for building purposes abound. Vast quantities of coal are found, and the river furnishes a fine water-power—claimed to be the best in the state. Pork-packing is conducted on an extensive scale. There are 2 foundries; a sewing-machine ruffler factory; 2 furniture shops; wagon and carriage-shops; a steam-plow factory; linseed-oil, starch, and flour mills; planing-mills; barrel factories and machine-shops; with various other industries; employing 3,000 people and $1,500,000 capital. The municipal assessment 1889 was $3,500,000. A 'coal palace' 230 ft. long by 130 ft. wide and a tower 200 ft. high, built of coal and costing about $30,000, was erected 1890 as an agricultural, mechanical, and industrial exhibition building. O. was settled about 1843 and was incorporated as a city 1857. Pop. (1870) 5,214; (1880) 9,004; (1890) 14,001; (1900) 18,197; (1910) 22,012.

OTWAY, *ŏt'wā*, THOMAS: English dramatist: 1651, Mar. 3—1685, Apr. 14; b. Trotton, near Medhurst, Sussex; son of the rector of the church in the adjoining village. He left Oxford without taking a degree, and went to London in search of fortune in 1671. He appeared on the stage, but made a signal failure; and next he applied himself to dramatic composition. In 1675, *Alcibiades*, his first tragedy, was printed; and in the following year he produced *Don Carlos*, a rhymed tragedy, puerile but full of vigorous declamation which made it extremely popular, so that it 'got more money than any preceding modern tragedy.' His first comedy, *Friendship in Fashion*, appeared 1678, and, being sufficiently immoral to please the taste of the age, met general appreciation. In 1677 O. received a cornet's commission in a regiment, which, however, was disbanded 1678, and O. resuming his former occupation, produced the tragedy *Caius Marius* (confessed plagiarism from *Romeo and Juliet*) 1680. In the same year *The Or-*

phan met an extraordinary, and, in some respects, a deserved measure of success, though its moral standard would now be found far too low. In 1681, *The Soldier of Fortune* appeared; and in the following year, the finest of all his plays, *Venice Preserved*, was produced—a masterpiece of dramatic pathos. From this time till his death, the poet had much to endure from poverty and neglect. Debts accumulating upon him, he retired to an obscure public-house on Tower Hill, to avoid his creditors; and here, at the premature age of 34, he died in desolateness and want. Although O. achieved a brilliant reputation during his lifetime, although he is described by Dryden—and truly—as possessing a power of moving the passions which he himself did not possess, and later by Sir Walter Scott as being Shakespeare's equal, if not his superior, in depicting the power of affection; yet his plots are artificial, and his language is without fancy, melody, or polish. Unexcelled, perhaps even unequalled in the pathos of the situations which he depicts and in power to move the feelings thereby, he lacks the pathos which pertains to personality and character; while aside from the pathetic his work is mediocre.

OUBLIETTE, n. *ô-blĭ-ĕt′* [F. *oublier;* L. *obliviscor*, to forget]: a dungeon constructed in some old castles and buildings, in which were confined persons condemned to perpetual imprisonment or to secret death. A spiral staircase from the ground floor of the castle descended into a vaulted chamber, in the centre of the floor of which was an opening into the dungeon, this opening being not only the entrance into it, but the only means for the admission of air and light. These dungeons often extended below the bottom of the moat which surrounded the castle.

OUCH, n. *owch* [OF. *nouche*, a buckle, a clasp: OHG. *nusca*, a buckle: OE. *owche* or *nouche*, a jewel: mid. L. *nusca*, a brooch; *oscleium*, a wedding-gift, a jewel-case]: the collet or socket in which a precious stone or a seal is set; in *OE.*, a jewel.

OUDE, or Oudh, *owd:* province of British India, separated on the n. from Nepaul by the lower ranges of the Himalaya, whence it gradually slopes to the Ganges; extreme length, 270 m.; breadth, 160; 23,992 sq. m. Formerly an independent chief commissionership, it is now administered by the lieut. gov. of the N. W. Provinces. O. is one great plain, sloping from n.w. to s.e. Its chief rivers are the Gumti, the Ghagra (Ghogra), and the Rapti, which swarm with alligators. The n. part, on the edge of the Himalaya, is not very well known. It forms a portion of the Terai, a vast unhealthful tract stretching along the borders of Nepaul, and covered with impassable forests. The climate of O. is cool and pleasant from Nov. to Mar.; during the next four months it is hot and sultry, after which follows the long rainy season, but in general it is considered

the most healthful along the whole valley of the Ganges. The soil is light, and except small nodules of chalk and oolite called *kankars*, there is hardly a loose stone to be seen. O. was formerly more copiously watered than now, the clearing of the jungles having greatly decreased the moisture of the land. The chief crops are wheat, barley, gram, masure, mustard, rice (of the finest quality), millet, maize, joar, bajra, various kinds of pulse and oil-seeds, sugar-cane, tobacco, indigo, hemp, and cotton. The manufacturing industry of O. is not important; soda, saltpetre, and salt are the only articles of which more is produced than is requisite for home-consumption. Gunpowder, and all kinds of military weapons, guns, swords, spears, shields, and bows of bamboo, or Lucknow steel, are, however, also made, besides some woolen goods, paper, etc. Bridges are few, if any, and the roads in general bad. The principal is the famous military road from Cawnpore n.e. to Lucknow. The people are of warlike disposition. The bulk of the inhabitants are Hindus, though the dominant race for centuries has been Mohammedan. The Brahmans are the most numerous class, but there are 29 different Rajput tribes. These two classes mainly supplied the mutinous sepoys of the Bengal army. The language spoken is Hindustani.

The most characteristic feature in the social economy of O. is its *village-system*, for a description of which see INDIA. The *ryots*, or cultivators of the soil, cling with extraordinary affection to the land which their fathers have tilled for ages, and thoroughly believe that they have a right of property in it; and, in general, we believe that they are *actually* the owners of their farms, but in many cases they have been dispossessed by a class of tax-gatherers (resembling the Roman *publicani*) called *talukdars*, who farmed from the Mogul, and afterward from the king of O., the revenues of a collection of villages called a *talukah*, and by their extortions so impoverished the ryots, or peasant-proprietors, that the latter were often forced to execute deeds transferring their property to the talukdars. Many of the more spirited would not submit to become *tenants*, and taking to the jungles, waged war on the new occupants of their ancestral lands, until gradually they sank into *dacoits*, or professional robbers. The extortions of the talukdars continued till the annexation of the country 1856, and the country suffered severely from the retaliatory raids of the dispossessed ryots. The E. India Company reinstated the ryots in their property, where the talukdars could not show undisputed possession for 12 years —a proceeding which gave great offense to the latter, who, in consequence, assumed a coldly hostile attitude to the British during the great mutiny of the following year.

The principal towns are Lucknow (q.v.), Fyzabad, Oude, or Ayodha, Roy Bareily, and Shahabad.

O. is believed, by Sanskrit scholars, to be the anc.

Kosala, oldest seat of civilization in India. The country was conquered by a Mohammedan army 1195, and made a province of the Mogul empire. In 1753 the vizier of O., Saffdar Jung, rebelled against his imperial master, Ahmed Shah, and forced the latter to make the governorship hereditary in his family. His son, Sujah-ud-Dowlah, became entirely independent, and founded a dynasty which ruled the country, generally in a most deplorable manner; until, in the interests of the wretched inhabitants, the E. India Company was obliged to adopt the extreme measure of annexation 1856, Feb. 7. The necessity for this high-handed but most beneficent act will be better understood if we read the statistics of crime in O. during the last years of its independence: one item will suffice: 1848–54, there were, on an average, no fewer than 78 villages burned and plundered every year, while murders, robberies, abductions, and extortions were daily occurrences. A feeble king, a blackguard soldiery, and a lawless peasantry had brought about a helpless and ruinous anarchy. When the mutiny of 1857 broke out, O. became one of the great centres of rebellion. Upon this, the confiscation of all the estates of the talukdars was proclaimed by Lord Canning; but when the country was subdued by British arms, the estates of all such as laid down their arms and swore fealty to the British govt. were restored. The forts of the petty chiefs, however, were dismantled, and the inhabitants disarmed. The province is now administered by a chief commissioner. The chief feature of the present condition of affairs in O. is the preservation in their integrity of the estates of the talukdars. The amount of govt. revenue paid by the talukdars is about £1,000,000.—Pop. (1869) 11,220,232; (1881) 11,387,741, about 475 to the sq. m.—probably the most dense rural pop. in the world; (1891) 12,652,730; (1901) 12,833,077.

OUDENARDE, *ow-dėn-ȧr′dėh*: town in the province of E. Flanders, Belgium; chiefly on the e. bank of the Scheldt, 16 m. s. by e. from Ghent. It has a fine Gothic council-house, important manufactures of linen and cotton fabrics, and many extensive tanneries. The town was taken by the French, aided by an English force, 1658; it was besieged 1674, by the stadtholder, William (III. of England) of Orange; and 1706 it was taken by Marlborough. An attempt by the French to retake it, brought on the famous battle of Oudenarde, one of Marlborough's most celebrated victories, gained 1708, July 11, with the aid of Prince Eugene, over a French army under the Duke of Burgundy and Marshal Villars. After this battle, the French king made offers of peace, which were not accepted. Pop. (1890) 6,141.

OUDENODON, n. *û-dĕn′ō-dŏn* [Gr. *ouden*, none; *odous* or *odonta*, a tooth]: in *geol.*, a subgenus of very peculiar fossil reptiles found in the sandstone of south Africa, so called from their toothless jaws.

OUDH, or OUDE, or AWADH: one of the principal towns of the province Oude (q.v.); amid ruins on a hilly site on the right bank of the Sarayû or Goggra river, 80 m. e. of Lucknow. It is called also *Hanumangâ'dhi*, on account of a temple erected there in honor of Hanuman (q.v.), the fabled monkey-ally of Râma, an incarnation of the god Vish'nu. The name O. is a corruption of the Sanskrit *Ayodhyâ* (from *a*, not, and *yodhya*, conquerable, hence 'the invincible' city); but the ancient city of that name was situated opposite the modern O., where its ruins may still be seen. Ayodhyâ was one of the oldest seats of civilization in India; it was the residence of the solar dynasty, or one of the two oldest dynasties of India, deriving its descent from the sun; but it obtained special renown through Râma, son of Das'aratha, a king of that dynasty. Its great beauty and immense size are dwelt on in several of the Purânas and modern poems, especially in the *Râmâyan'a* (q.v.), the first and last books of which contain a description of it. According to some Purânas (q.v.), Ayodhyâ was one of the seven sacred cities, the living at which was supposed to free a man from all sin, and the dying at which, to secure eternal bliss. It was called also Sâketa, Kos'alâ, and Uttara-kos'alâ. See Goldstücker's *Sanskrit Dictionary*, under AYODHYÂ.

OUDINOT, *ô-de-nō'*, CHARLES NICOLAS, Duke of Reggio, Marshal of France: 1767, Apr. 25—1847, Sep. 13; b. Bar-le-Duc, dept. of Meuse, France. At the age of 17, he entered the army, but returned home after three years' service. Having distinguished himself 1790 by suppressing a popular insurrection in his native district, he was, after some volunteer service, 1793, Nov., raised to the rank of chief of brigade, in the fourth regt. of the line, and distinguished himself in various actions with the Prussians and Austrians. He was wounded and taken prisoner before Mannheim, by the Austrians, but was soon exchanged, and served in the armies of the Rhine under Moreau, and in that of Switzerland under Massena. He was promoted gen. of division 1799, Apr. 12; and for a daring capture of a battery at Pozzola, was presented by the first consul with a sabre of honor and the cannon which he had taken. In 1805 he received the grand cross of the Legion of Honor, and about the same time received command of ten battalions of the reserve, afterward known as the 'grenadiers Oudinot.' At the head of this corps, he did good service in the Austrian campaign. He was present at Austerlitz and Jena, and gained the battle of Ostrolinka, 1807, Feb. 16, for which he was rewarded with the title Count, and a large sum of money. He greatly contributed to the success of the French at Friedland, and was presented by Napoleon to Czar Alexander as the 'Bayard of the French army, the knight *sans peur et sans reproche*.' He sustained his brilliant reputation in the second Austrian campaign of 1809, and July 12 was created Marshal of France, and Aug. 15, Duke of Reggio. In 1810 he

was charged with the occupation of Holland, and by his unswerving probity and attractive personal qualities, drew the esteem of all classes. He was engaged in the disastrous Russian campaign, and subsequently took part in the various battles of 1813 between the French and the Russians and Austrians, being defeated at Gros Beeren. He was one of the last to abandon Napoleon, but he did so for ever, and spent the 'Hundred Days' on his own estates. At the second restoration he became a minister of state, commander-in-chief of the royal guard and of the national guard, and was created a peer of France, grand cross of St. Louis, etc. In 1823 he commanded the first division of the army of Spain, and was for some time gov. of Madrid. After the revolution of 1830, July, O. retired to his estates, and only at rare intervals presented himself in the chamber of peers. He became grand chancellor of the Legion of Honor 1839, May, succeeded Marshal Moncey as gov. of the Invalides 1842, Oct.; and died at Paris 1847. A statue was erected in his honor at Bar, 1850, Sep. 29.—His son, Charles Nicolas-Victor Oudinot, Duke of Reggio (1791–1863), was a distinguished gen. in the French army, commander-in-chief of the army of the Alps; and 1849, gen. of the French expedition against Rome, which forced the city to surrender. He was, however, not a Napoleonist. O. wrote several books on military matters.

OUGHT, v. *awt* [see Aught and Owe]: a defective verb, formerly the pt. of *owe;* to be bound in duty or moral obligation: N. anything.

OUGRÉE, *ô-grā′:* town of Belgium, three m. from Liége, on the Meuse. It has iron-works, a cannon-foundry, and oil and flour mills. Pop. 7,000.

OUIDA, *ô-ē′da* (child's mispronunciation of Louisa): see De la Ramée, Louisa.

OUIS′TITI: see Marmoset.

OU′LACHAN: see Candle-fish.

OULOPHOLITE, *ô-lŏf′ō-līt* [Gr. *oulos*, wool; *pholeos*, cave; *lithos*, stone]: name given to gypsum that has assumed certain curved or twisted forms. The word is employed in descriptions of the Mammoth Cave of Kentucky.

OULORRHAGY, *ô-lŏr′a-jĭ*, or Ulorrhagia [Gr. *oulon*, gum; root *rhag*, flow]: bleeding of the gums.

OUNCE, n. *owns* [F. *once*, an ounce—from It. *oncia*—from L. *uncĭa* (derived by Varro from *unus*), name of the 12th part of the *as* or *libra* (pound), applied also to the 12th part of any magnitude, whether of length, surface, or capacity: thence *inch*, the 12th part of a foot]: a division of the pound weight; one-12th of a lb. troy; one-16th of a lb. avoirdupois: see Pound.

OUNCE, n. *owns*, or Once, n. *ŏns* [F. *once:* Sp. *onza*], (*Felis Uncia*, or *Leopardus Uncia*): large feline animal,

nearly resembling the leopard, but having much rougher and longer hair, a longer and much more bushy tail; the general color is also paler, the rosette-like spots are less sharply defined, and there is a black spot behind the ears. Little is known of the O.; it is described by Buffon, but naturalists were for some time inclined to regard it as identical with the leopard, and its name has been transferred in S. America to the jaguar. It is a native of India and Persia, and probably of mountainous districts.

OUNCE-LAND, *owns′land:* in the Orkney Islands, before annexation to Scotland, an area of land paying an annual tax of an ounce of silver; in Orkney dialect, *Unisland.*

OUNDY, *own′dĭ* [L. *unda*, wave—through OF. *ounde*]: wavy; undulating; scalloped.

OUR, pron. *owr* [Goth. and Ger. *uns*, us: Goth. *unsar;* Ger. *unser;* AS. *ure*, our]: pertaining to or belonging to us. OURS, *owrz*, poss. of *we:* when the noun is expressed, *our* is employed—as, *our* house; when no noun is expressed, *ours* is employed—as, that house is *ours*, that is, *our* house. OURSELF, comp. pron. *owr-sĕlf′*, plu. OURSELVES, *owr-sĕlvz′*, not another or other; used almost wholly in the plural, and by way of emphasis. OURSELF, in *OE.*, used in the regal style.

OURANG-OUTANG: another spelling of ORANG-OUTANG.

OURANOGRAPHY, n. *ow′răn-ŏg′ră-fi* [Gr. *ourănos*, heaven; *graphō*, I write]: a description of the heavens.

OUR′ARI: see CURARE.

OURAY, *ô-rā′:* city, cap. of Ouray co., Colo., on the Uncompahgre river and the Denver and Rio Grande railroad; at the foot of Mount Hayden, 400 m. s.w. of Denver; 7,200 ft. above sea-level. It is at the bottom of a deep bowl in the Rocky Mountains, was named after the celebrated Ute Indian chief, and was reached first by adventurous mining prospectors 1875, July. Though more than 300 m. from a shipping-point, the richness of its gold and silver mines attracted large numbers of experienced miners, and merchants and traders soon followed. The publication of a weekly newspaper, *The Solid Muldoon*, 1878, gave the town its first celebrity; and the extension to it of the Denver and Rio Grande railroad, 1887, brought it in communication with the outer world, and in one year nearly doubled its output of precious minerals. The town contains a co. court-house; Meth. Episc., Presb., Prot. Episc., and Rom. Cath. churches; excellent school facilities: water-works; electric light plant; sampling-mills; hospital for sick and injured miners; 1 private bank; 2 weekly newspapers. All local expenses are defrayed by saloon license fees. The mineral outp. was (1876) $800; (1887) $1,497,892; (1888) $2,123,000. Pop. (1880) 865; (1890) 2,534; (1910) 1,644.

OURO PRETO, *ô′rō prā′tō* (black gold): city of Brazil, cap. of the province of Minas Geraes; among barren mountains, 4,000 ft. above sea-level, 200 m. n.n.w. of Rio Janeiro. It contains the governor's residence and a college, and consists mainly of narrow and irregular streets. Although the neighboring mountains are very auriferous, and the mines were formerly the richest in the kingdom, the mining is now reduced to comparatively unprofitable washings. There is good trade in coffee, etc., with Rio Janeiro, though retarded by lack of good roads. The journey from O. P. to the cap. of the republic is performed by horses and mules only, and ordinarily requires 15 days. Pop. (1890) 22,000.

OUSE, *ôz;* for distinction called also the NORTHERN or YORKSHIRE OUSE: river in England, formed by union of the Swale and the Ure, in the immediate vicinity of the village of Boroughbridge, and flowing s.e. past York, Selby, and Goole. About eight m. below Goole, it joins the Trent, and forms the estuary of the Humber. The length of its course from Boroughbridge is 60 m., for the last 45 of which (from the city of York) it is navigable for large vessels. Its principal affluents are the Wharf and the Aire from the w., and the Derwent from the n.e. The basin of the O., or the Vale of York, commences from the n. boundary of the county, near the river Tees, from whose basin it is separated by a low ridge of hills, and extends s., including almost the whole of the county. See YORKSHIRE.

OUSE, ôz, GREAT: river in England, rising close to the town Brackley, in the s. of Northamptonshire, and flowing n.e. through the counties of Buckingham, Bedford, Huntingdon, Cambridge, and Norfolk—falling into the Wash 2½ m. below King's Lynn. It is 160 m. in entire length, and is navigable about 50 m. It receives from the e. and s. the Ivel, Cam, Lark, and Little Ouse.

OU'SEL: see OUZEL.

OUSELEY, ôz'lē, Sir FREDERICK ARTHUR GORE, MUS. DOC. 1825, Aug. 12—1889, Apr. 6, son of Sir Gore O. He graduated from Christ-Church, Oxford, 1846, and took the degree M.A. 1849. In the latter year he was ordained deacon, and priest 1855. He had a remarkable talent for music, composed an opera when 8 years of age, received from Oxford the degree Bachelor of Music 1850 and Doctor of Music 1854, and became prof. of music in Oxford Univ. 1855. He built a fine church, of which he became vicar 1856; and was one of the founders of St. Michael's College, of which he has long been warden. In 1886 he became canon of Hereford Cathedral. He has published *Hagar*, an oratorio, a large number of anthems, and several works on music, which have been accepted as standards. Among his books are: *Harmony* (1869); *Counterpoint and Fugue* (1869); and a *Treatise on Musical Form and General Composition* (1875).

OUSE'LEY, GIDEON: 1762–1839, May 14; b. Dunmore, Galway, Ireland. He was liberally educated, in hope that he would enter the govt. service, but became a convert to the Wesleyan faith 1789, and commenced preaching as an evangelist. For 7 years he preached with great success to crowds which he collected in the streets, at fairs, and at markets. The Wesleyans appointed him their missionary for Ireland 1799. He travelled throughout the country, usually sat on his horse while preaching, and often preached from 3 to 5 sermons per day. His converts were numbered by thousands, and included many young men who had been educated for the Rom. Cath. priesthood. He is known as 'the Protestant apostle of Ireland.' He wrote several books, of which *Old Christianity and Papal Novelties* had widest circulation.

OUSE'LEY, Sir WILLIAM, LL.D.: orientalist: 1769–1842; b. Monmouthshire, England; son of Capt. Ralph O.; of an Irish family. He was for a short time cornet of dragoons, but retired from the army to devote himself to the study of Oriental languages. He wrote *Persian Miscellanies; Oriental Collections; Epitome of Persian History; Oriental Geography; Observations on Some Medals and Gems Bearing Inscriptions in the Pahlavi or Ancient Persian Character; Travels in Persia; Anecdotes from Oriental Bibliography.*

OUSE'LEY, Sir WILLIAM GORE, D.C.L.: 1791–1866, Mar. 6; b. London: diplomat. He entered the diplomatic service early in life, and served in many countries in both hemispheres. He was an *attaché* of the British legation at Stockholm 1817, at Washington 1825, and held sundry diplomatic positions at Rio Janeiro, Buenos Ayres, Montevideo, and Asuncion 1832–51; visited the United States on a special mission 1857. He wrote: *Remarks on the Statistics and Political Institutions of the United States* (1832); *Notes on the Slave Trade* (1850); *Views of S. America* (1852).

OUST, v. *owst* [OF. *oster;* F. *ôter*, to remove, to expel from—from mid. L. *haustare*, to drink often—*haurīrĕ*, to drink: Prov. *ostar*, to take away (see OUT 1)]: to remove by force; to oject or expel. OUST'ING, imp. OUST'ED, pp. OUST'ER, in *law:* see EJECTMENT, ACTION OF.

OUT, a. *owt* [Icel. *út;* AS. *ute;* Ger. *aus*, out, out of—perhaps from the cry *huss* or *hut!* used to drive out dogs: W. *hwt*, off, away: Sw. *hut*, away, quiet, applied to dogs]: exterior: AD. on or to the outside; without; not at home; in a state of exhaustion; in a state of extinction; not in office; not in employment; to the end, as, 'hear me *out;*' without restraint, as, 'I dare laugh *out;*' not in the hands of the owner, as, 'the lands are *out* upon lease;' with parts of clothes torn, as, *out* at the elbows; *out* at heels, denoting poverty; incurring loss, as, *out* of pocket: INT. away; begone: PREFIX, beyond; exceeding; above. OUT OF, prep. from; beyond; not in; not within; deviating from; without; in consequence of. TO FIND OUT, to discover. TO LET OUT, to put forth strength or speed; to reveal. TO CROP OUT, in *geol.*, to show itself, as a stratum, thrust up and appearing on the surface. TO PUT OUT, to annoy; to disturb; to perplex. OUT AND OUT, thoroughgoing; complete. OUT OF THE WAY, outlying; obscure; uncommon; unusual; eccentric. OUT OF HAND, immediately. OUT OF PRINT, said of a book of which all the copies have been sold or otherwise disposed of. OUT OF SEASON, not in the proper time or season. OUT OF SORTS, ailing; unwell. OUT OF TEMPER, in bad temper; sullen. OUT OF TRIM, not properly prepared. OUT OF TUNE, harsh; discordant. OUT UPON YOU and OUT UPON IT, away with you; away with it—phrases expressing dislike or contempt. *Note.*—In all words having *out* as a prefix, the root-words are found by referring to the word and its prefix—**the prefix meaning 'beyond; exceeding; above.'**

OUT, n. *owt* [see OUT 1]: one who or that which is without; opposed to *in;* a nook or corner; an open space: V. to deprive by expulsion. OUT'ING, imp.: N. a trip; a going from home on pleasure. OUT'ED, pp. OUTNESS, n. *owt'nĕs*, the state of being out; externality. INS AND OUTS, nooks and corners. TO MAKE AN OUT, among *printers*, to omit something in setting up copy.

OUTBALANCE, v. *owt-băl'ăns:* to exceed in weight or effect.

OUTBID, v. *owt-bĭd':* to bid more than another.

OUTBOUND, a. *owt'bownd:* proceeding from one country to another, as a ship.

OUTBRAVE, v. *owt-brāv':* to bear down by more daring or by greater splendor.

OUTBREAK, n. *owt'brāk:* an eruption; a bursting forth. OUT'BREAKING, n. that which bursts forth.

OUTBUILDING, n. *owt'bĭld-ĭng:* a building for common purposes near a large one.

OUT'BURST, n.: a breaking out; an explosion.

OUTCAST, n. *owt'kăst:* one cast out or expelled; one driven from home or country.

OUTCRAFT, v. *owt-krăft':* in *OE.*, to excel in cunning.

OUTCROP, n. *owt'krŏp:* the exposure of the edge of strata at the earth's surface; edge of an inclined bed at the place where it rises to the surface. The line of the outcrop is called the strike, which is always at right angles to the dip. A stratum coming to the surface is said to *crop out.*

OUTCRY, n. *owt'krī:* clamor; noisy opposition; cry of distress.

OUTDO, v. *owt-dô':* to surpass; to perform beyond another.

OUTDOOR, a. *owt'dōr:* being without the door; given to one not residing in the house, as, outdoor relief. OUTDOORS, or OUT OF DOORS, out of the house.

OUTED, a. *owt'ĕd* [from *out*]: put out; ended.

OUTER, a. *owt'ėr* [from *out*]: external; opposed to *inner.* OUT'ERLY, ad. *-lĭ.* OUT'ERMOST, a. *-mōst*, farthest out; remotest from the middle.

OUT'ER HOUSE: see COURT OF SESSION.

OUTFACE, v. *owt-fās':* in *OE.*, to bear down with impudence; to brave.

OUTFIT, n. *owt'fit:* necessaries, as clothing, etc., supplied for a sea-voyage; equipment—often in the plu. OUTFITS. OUT'FITTING, imp.: N. equipment for a voyage. OUT'FITTED, pp. OUT'FITTER, n. *-tėr*, a general dealer in everything necessary for a voyage, journey, or expedition, or the requisites for any business. OUTFIT ALLOWANCE, in an *army*, a sum granted to non-commissioned officers promoted to commissions, to enable them to meet the charges for uniform and equipments.

OUTFLANK, v. *owt-flăngk′:* to extend a line of battle beyond that of another. OUTFLANK′ING, imp. OUTFLANKED′, pp. *-flăngkt′.*

OUTFLOW, n. *owt′flō:* a flowing out; an efflux.

OUTFLY, v. *owt-flī′:* to leave behind in flight.

OUTFROWN, v. *owt-frown′:* to overbear by frowns; to frown down.

OUTGENERAL, v. *owt-jĕn′ĕr-ăl:* to gain advantage over by superior military skill. OUTGEN′ERALLING, or OUTGEN′ERALING, imp. OUTGEN′ERALLED, or OUTGEN′ERALED, pp. *-ăld.*

OUTGOING, n. *owt′gō-ĭng:* state of going out; expenditure; outlay; generally in plu. OUT′GOINGS, expenditure: ADJ. opposed to *incoming*, as, *outgoing* tenant.

OUTGROW, v. *owt-grō′:* to grow too much for a time. OUT′GROWTH, n. *-grōth*, an excrescence.

OUTGUARD, n. *owt′gârd:* the farthest distant guard.

OUT-HEROD, v. *owt-hĕr′ŏd* [*out*, and *Herod*, the king of the Jews at the birth of Christ]: to overact the character of Herod; to surpass in wrong-doing. OUT-HER′ODING, imp. OUT-HER′ODED, pp.

OUTHOUSE, n. *owt′hows:* a little house at a small distance from the main one.

OUTING, n. *owt′ĭng* [Icel. *út*, out (see OUT 1)]: a holiday excursion, generally to the seaside or country.

OUTLANDISH, a. *owt-lănd′ĭsh* [AS. *utlendisc;* Icel. *utlendr*, outlandish, foreign]: not native; foreign; vulgar; rude. OUTLAND′ISHNESS, n. *-ĭsh-nĕs*, state of being strange, rude, or barbarous. *Note.*—In OE., *inland*, in the sense of 'civilized,' was opposed to *outlandish*, rude; foreign: see INLAND.

OUTLAST, v. *owt-lăst′:* to last longer than. OUTLAST′ING, imp. OUTLAST′ED, pp.

OUTLAW, n. *owt′law* [AS. *utlah*: Icel. *utlægja* an exile, an outlaw]: a person deprived of the benefit of law: V. to deprive of the benefit and protection of law; to proscribe. OUT′LAWING, imp. OUT′LAWED, pp. *-lawd:* ADJ. excluded from the benefit of law. OUTLAWRY, n. *owt′law-rĭ*, in *English law*, act of putting one out of the protection of the law, for contempt in wilfully avoiding execution of legal process. Formerly, in the common law courts, if the defender would not enter an appearance, certain proceedings were taken to outlaw him, so as to allow the action to go on without his appearance. These proceedings are now abolished; and, in the majority of cases, it is immaterial as regards the action whether the defendant appear or not, provided he was properly served with the original writ of summons. After judgment, he may still be outlawed, as a preliminary to seizing and selling his property. In criminal proceedings, outlawry still exists as part of the ordinary practice to compel a person against whom a bill of indictment for felony or misdemeanor has been found,

but who will not come forward to take his trial, and who has not been arrested. In such a case, process of outlawry against him is awarded, which is a kind of temporary judgment; and while this process exists, he is out of the protection of the law, and forfeits all his property. The courts will not listen to any complaint or attend to his suit till he reverse the outlawry, which is generally done as a matter of course.—In the United States, there is now no process of outlawry in *civil* cases: it was always exceedingly rare, and has long been abolished in all the states.

OUTLAY, n. *owt′lā:* expenditure.

OUTLEARN, v. *owt-lėrn′:* in *OE.*, to discover.

OUTLET, n. *owt′lĕt* [Icel. *útlát: out*, and *let*]: the place or means by which anything escapes or is discharged.

OUTLICKER, n. *owt′lĭk-ėr* [Ger. *auslieger*, outrigger]: in *ships*, a small piece of timber fastened to the top of the poop, and standing out astern.

OUTLIERS, n. plu. *owt′lī-ėrz:* in *geol.*, portions of any stratified group of rocks which lie detached, or out from the main body.

OUTLINE, n. *owt′līn:* the line by which a figure is defined; the first sketch of a figure, or of a scheme or design: V. to sketch; to delineate. OUT′LINING, imp. OUT′LINED, pp. *-līnd.*—SYN. of 'outline, n.': delineation; sketch; draught; contour; plan; design; extremity.

OUTLIVE, v. *owt-lĭv′:* to live beyond; to survive; to live after something has ceased. OUTLIV′ING, imp. OUTLIVED, pp. *-lĭvd′.*

OUTLOOK, n. *owt′lûk:* a vigilant watch; a prospect or view: V. in *OE.*, to browbeat; to look out.

OUTLUSTRE, or OUTLUSTER, v. *owt-lŭs′tėr* [*out*, and *lustre*]: to excel in brightness.

OUTLYING, a. *owt′lī-ĭng:* remote from the main body or design; being on the exterior or frontier.

OUTMANEUVER, v. *owt′mă-nô′vėr:* to surpass in maneuver.

OUTMARCH, v. *owt-mârch′:* to march faster than.

OUTMOST, a. *owt′mōst:* farthest remote from the middle.

OUTNESS: see under OUT 2.

OUTNUMBER, v. *owt-nŭm′bėr:* to exceed in number.

OUT-PENSIONER, n. *owt′-pĕn-shŭn-ėr:* an invalid soldier or sailor, who is a pensioner of Chelsea or Greenwich hospitals, and is at liberty to reside where he pleases.

OUTPORT, n. *owt′pōrt:* a port or harbor at some distance from the chief port.

OUTPOST, n. *owt′pōst:* in *military affairs*, a station at a distance from the main body; the company of soldiers so placed. Such bodies of troops, usually small, are posted for the purpose of preventing an enemy approaching without notice; also to offer opposition to his progress, while the main force prepares for resistance. Outguards march off to their position silently, and pay no compliments of any kind to officers or others. As soon as the officer commanding an O. arrives on his ground, he proceeds to examine carefully the environs, noting all heights within rifle-range, roads and paths by which an enemy may approach, etc. He also takes such impromptu means of strengthening his position as occur to him—felling a tree here, cutting brushwood there, blocking a path in another place, and resorting to any expedient which may serve to delay the foe at point-blank range—an object of importance, as a stoppage at such a point is known to act as a great discouragement to advancing troops.

OUTPOUR, v. *owt-pōr′:* to send forth in a stream. OUTPOURING, n. *owt′pōr-ĭng*, an effusion; an abundant supply.

OUTPUT, n. *owt′pŭt:* a term in the iron or coal trade for the quantity of metal annually made by the furnaces, or for the quantity of coal produced from one or more pits.

OUTRAGE, n. *owt′rāj* [OF. *oultrage* or *outrage*, excess, unreasonableness—from L. *ultra;* OF. *oltre* and *outre*, beyond, exceeding, with postfix *-age* = L. *-aticum:* It. *oltraggio*]: open and wanton violence either to a person or thing; excessive injury; abuse: V. to treat with extreme violence and injury; to injure by rude, rough treatment of anything; to do violence in words; violate. OUTRAGING, imp. OUTRAGED, pp. *owt′rājd.* OUTRA′GEOUS, a. *-rā′jŭs*, excessive in a high degree; violent; exceeding all bounds of moderation. OUTRA′GEOUSLY, ad. *-lĭ.* OUTRA′GEOUSNESS, n. *-nĕs*, the quality of being outrageous; fury; violence.—SYN. of 'outrage, n.': affront; abuse; insult; violence; injury;—of 'outrageous': violent; furious; raging; exorbitant; turbulent; tumultuous; excessive; enormous; atrocious.

OUTRAM, *ô′tram*, Sir JAMES, G.C.B.: lieutenant-general and statesman: 1803, Jan. 29—1863, Mar. 11; b. Butterley Hall, Derbyshire, England, the residence of his father, Benjamin O., a civil engineer. O. studied at Marischal College, Aberdeen; was sent to India as cadet 1819; was made lieut. and adjt. of the 23d Bombay native infantry; then took command of and disciplined the wild Bheels of Candeish, and successfully led them against the Daung tribes. 1835–38 he was engaged in re-establishing order in the Mahi Kânta. He went as aide-de-camp with Lord Keane into Afghanistan; and his ride from Kelat, through the dangers of the Bolan Pass, is famous in Indian annals. As commissioner in Sinde, he made a bold defense of the Ameers against the aggressive policy of Gen. Sir Charles James Napier. He

was afterward resident at Satara and Baroda, and on the annexation of Oude was made resident and commissioner by Lord Dalhousie. His health failing, he returned to England 1856; but when the war with Persia broke out, O. accompanied the expedition to the Persian Gulf, with diplomatic powers as commissioner. He conducted several brilliant and successful operations; the campaign was short, decisive, and triumphant. Returning to India 1857, he was commissioned to take charge of the forces advancing to the relief of Lucknow. He chivalrously waived the command in favor of his old lieut., Havelock (q.v.), and, taking up only his civil appointment as chief commissioner of Oude, tendered his military services to Havelock as a volunteer. Lucknow was relieved, and O. took the command, but only to be in turn besieged. He held the Alum Bagh against almost overwhelming forces, until Lord Clyde advanced to his relief. He then made a skilful movement up the left bank of the Gumti, which led to a final and complete victory over the insurgents. He was made chief commissioner of Oude; and though he had strongly opposed its annexation, he was the man who did most to restore British rule, and attach the people to it. For his eminent services, he was promoted to the rank of lieut.gen. 1858, and received the thanks of parliament 1860. He took his seat as a member of the supreme council of India, in Calcutta, but sank under the climate, and returned to England 1860, stricken by fatal disease. The communities of India voted him a statue at Calcutta, founded an institution to his honor, and presented him with commemorative gifts. A banquet was given to him and his chief and companion-in-arms, Lord Clyde, by the city of London. His English admirers determined to erect a statue to his honor in London. He spent the winter 1861–2 in Egypt; and, after a short residence in s. France, died at Paris. O. was styled, by Sir Charles Napier, the 'Bayard of India.' There is no more gallant name in the whole list of distinguished Indian soldiers. His services in the East, as soldier and diplomatist, extended over 40 years. He was ever the generous protector of the dark-skinned races among whom his lot was thrown, and set a bright example, to men in high office, of moderation, conciliation, humanity, and practical Christianity. See his *Biography* by Sir F. Goldsmid (1880).

OUTRÉ, a. *ô'trā* [F. *outré;* OF. *oltre*—from L *ultra*, beyond, exceeding]: extravagant; overstrained; exaggerated.

OUTREACH, v. *owt-rēch':* to extend beyond. OUTREACH'ING, imp. OUTREACHED, pp. *-rēcht'*.

OUTRIDE, v. *owt-rīd':* to ride faster than. OUTRI'DING, imp. OUTRID'DEN, pp. *-rīd'n*. OUT'RIDER, n. *-dėr*, a servant on horseback who attends a carriage, at some little distance from it

OUTRIGGER, n. *owt′rĭg-gẽr:* in its proper sense, a beam or spar fastened horizontally to the cross-trees or

Fig. 1.

otherwise, for the purpose of extending further from the mast or topmast the backstay or other rope by which that mast or topmast is supported: the power of the stay is thus increased. Such a contrivance is used to secure the masts in the operation of careening. The term is also used with doubtful propriety—because no 'rigging' is in the case—to denote the apparatus for increasing the leverage of an oar, by removing the resistance, as represented by the side of the boat (see OAR), further from the power represented by the rower's hand. This is effected by fixing an iron bracket to the boat's side, the row-lock being at the bracket's extremity; thus obtaining the necessary leverage without adding to the width of the boat itself. The name is applied also to the light racing-boats which have such row-lock projections. In the proas of the Indian seas, an O. is a contrivance to counterbalance their very large, heavy sails.

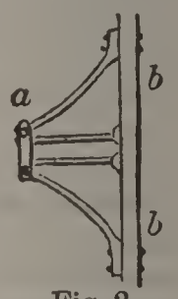


Fig. 2.

a, outrigger; *b*, side of boat.

OUTRIGHT, ad. *owt-rīt′:* at once; completely; utterly.

OUTROAD, n. *owt′rōd* [OE. *road*, a riding]: in *OE.*, a riding out; an excursion.

OUTROAR, n. *owt′rōr:* a great confusion of many loud voices: V. *owt-rōr′*, to roar louder than.

OUTRUN, v. *owt-rŭn′:* to excel in running; to exceed. OUTRUN THE CONSTABLE, to get into debt; to spend more than one's income—referring to the constable, the arrester for debt.

OUTSAIL, v. *owt-sāl′:* to leave behind in sailing.

OUTSCORN, v. *owt-skŏrn′:* in *OE.*, to bear down or confront by contempt.

OUTSELL, v. *owt-sĕl′:* to sell at a lower figure; to have a greater sale. OUTSEL′LING, imp. OUTSOLD′, pp.

OUTSET, n. *owt′sĕt:* beginning; first entrance on any business.

OUTSHINE, v. *owt-shīn′:* to send forth brightness; to excel in lustre.

OUTSIDE, n. *owt′sīd:* the external or outer part of a thing; superficial appearance; part most remote from the middle; the part lying without; the utmost; a passenger on the top of a coach: ADJ. external; exterior. OUTSIDES, n. plu. *owt′sīdz*, the exterior sheets of a ream of printing or writing paper; spoiled sheets of paper.

OUTSKIRTS, n. *owt′skĕrts:* border; suburbs.

OUTSLEEP, v. *owt-slēp′:* to sleep beyond.

OUTSPAN, v. *owt-spăn′* [Eng. *out*, and Dut. *spannen*, to put horses to—from *span*, a team]: a term used in Cape Colony, etc., for unyoking ox-teams from wagons. OUTSPAN′NING, imp. OUTSPANNED′, pp. *-spănd′*.

OUTSPEAK, v. *owt-spēk′:* in *OE.*, to speak out; to speak something beyond; to exceed.

OUTSPOKE, v. *owt-spōk′:* used in ballad poetry for *spoke*. OUTSPOKEN, a. *-spōk′n*, free of speech; bold of speech.

OUTSPREAD, v. *owt-sprĕd′:* to extend; to diffuse. OUTSPREAD′ING, imp.: N. the act of spreading over or diffusing.

OUTSTANDING, a. *owt-stănd′ĭng:* projecting; remaining uncollected or unpaid.

OUTSTARE, v. *owt-stār′:* to face down; to browbeat.

OUTSTEP, v. *owt-stĕp′:* to exceed.

OUTSTRETCH, v. *owt-strĕch′:* to expand; to spread out. OUTSTRETCH′ING, imp. OUTSTRETCHED′, pp. *-strĕcht′*.

OUTSTRIP, v. *owt-strĭp′:* to leave behind; to advance beyond.

OUTSWEAR, v. *owt-swār′:* to overpower by or go beyond in swearing.

OUTSWEETEN, v. *owt-swēt′ĕn:* to excel in sweetness.

OUTVALUE, v. *owt-văl′ū:* to exceed in value or price.

OUTVENOM, v. *owt-vĕn′ŏm:* to exceed in poisonous or deadly qualities.

OUTVIE, v. *owt-vī′:* to exceed in rivalry; to surpass. OUTVY′ING, imp. OUTVIED′, pp. *-vīd′*.

OUTVOICE, v. *owt-voys′:* in *OE.*, to exceed in clamor; to outroar.

OUTVOTE, v. *owt-vōt′:* to defeat by a higher number of votes. OUTVO′TING, imp. OUTVO′TED, pp.

OUTWALK, v. *owt-wawk′:* to leave behind in walking.

OUTWALL, n. *owt′wăl:* in *OE.*, outward part of a building; superficial appearance.

OUTWARD, a. *owt′wĕrd* [AS. *utweard*, outward—from *ute*, out; *weard*, toward]: external; extrinsic; forming the superficial part; opposed to *inward;* in *theol.*, carnal; not spiritual: N. in *OE.*, an external form. OUT′WARD, or OUT′WARDS, ad. *-wĕrdz*, to the outer parts; from the port of a country; seaward. OUT′WARDLY, ad. *-lĭ*, externally; in appearance only. OUTWARD-BOUND, a proceeding from a port of a country to foreign parts; opposed to *homeward-bound*.

OUTWEAR, v. *owt-wār′:* to wear out; to surpass in enduring qualities.

OUTWEIGH, v. *owt-wā′:* to exceed in weight, effect, or importance; to preponderate. OUTWEIGH′ING, imp. OUTWEIGHED′, pp. *-wād′*.

OUTWENT, v. *owt-wĕnt′:* pt. of verb Outgo; exceeded; surpassed in going or running.

OUTWIT, v. *owt-wĭt′:* to overreach; to defeat by superior ingenuity or craft. Outwit′ting, imp. Outwit′ted, pp.

OUTWORK, n. *owt′wėrk:* in *fortification*, a minor defense constructed beyond the main body of a work, for keeping the enemy at a distance, or commanding certain salient points which it is undesirable that he should occupy. Outworks are ravelins, lunettes, hornworks, crownworks, demilunes, tenailles, etc.: they occur in certain necessary order, as a ravelin before the curtain and tenaille, a hornwork before a ravelin, and so on.

OUTWORTH, v. *owt-wėrth′:* in *OE.*, to excel in value.

OUTWREST, v. *owt-rĕst′:* in *OE.*, to extort by violence.

OUVRARD, *ô-vrâr′*, Gabriel Julien: 1770, Oct. 11 —1846, Oct.: French contractor and financier. He entered mercantile life, and engaged in numerous speculations; became an object of suspicion 1793, and avoided arrest and execution as a public enemy by joining the army, in which he served with distinction. When peace was restored, he established himself in trade at Nantes, and 1797 secured a govt. contract, on which he realized nearly $3,000,000. He then organized a banking company at Paris, loaned immense sums of money to the govt., made large advances to the Spanish govt., and 1805 secured a monopoly of the Spanish colonial trade. The financial embarrassments of the Spanish govt. temporarily crippled the bank, though it continued in business till 1806, when Napoleon, whose ill-will had previously been incurred by its refusal of a loan, closed its affairs and placed O. under arrest. He succeeded in reaching Amsterdam 1810, but was again arrested, and was imprisoned till the overthrow of Napoleon 1813. He then secured various govt. contracts, planned a system of finance which was adopted by the govt., was prosecuted for fraud and imprisoned for some years, and on his liberation went to London, where he spent the remainder of his life in obscurity.

OUVRIERS, n. plu. *ûv′rĭ-āz* [F. *ouvrier;* OF. *ovrier*—from L. *operārĭŭs*, belonging to labor—from *opĕra*, work]: artificers; mechanics; journeymen.

OUZEL, or Ousel, n. *ô′zĕl* [AS. *osle;* Ger. *amsel*, black bird; OF. *oisel*, bird]: old name of the blackbird, as is evident from the descriptive lines of Bottom's song in *Midsummer Night's Dream:*

> 'The ousel cock, so black of hue,
> With orange tawny bill.'

It is applied also to other birds, chiefly of the thrush family. Thus, one British thrush is called the Ring Ouzel. The Dipper (q.v.) is generally known as the Water Ouzel; and the Rose-colored Pastor is called the Rose-colored Ouzel.

OVA, n. plu. *ō′vă* [L. *ova*, plu. of *ovum*, an egg]: the eggs of any animal; certain moldings in the form of eggs.

OVAL, a. *ō′văl* [OF. *oval;* F. *ovale;* Sp. *oval;* It. *ovale*, shaped like an egg—from L. *ovālis*—from *ovum*, an egg]: of oblong round form; having the figure or shape of an egg; applied to an outline or tracing in the form of a longitudinal section through the centre of an egg: N. a body or figure in the shape of an egg; an oval object; an ellipse; an outline in the form of a longitudinal section through the centre of an egg. The oval has a general resemblance to the ellipse; unlike the latter, however, it is not symmetrical, but is thicker at one end than the other, and at the thin end narrows almost to a point. The term 'oval' is also used indiscriminately with 'nodus,' 'loop,' to denote the figure formed either by a curve which returns upon itself, as the lemniscata, etc., or the loops of the cubical and semicubical parabolas and other curves. In scientific language, it is distinguished specially from the term 'elliptical,' with which, in common parlance, it is usually confounded. O′VALLY, ad. *-lĭ*, in an oval form; so as to be oval. OVALNESS, n. *ō′val-nĕs*, property of being oval. OVALOID, a. *ō′val-oyd*, somewhat oval. OVALESCENT, a. *ō-va-lĕs′ĕnt*, tending to assume an oval form.

OVALBUMEN, n. *ō′văl-bū′mĕn* [L. *ovum*, an egg; *albumen*, white of egg]: albumen of an egg, as distinguished from albumen coming from any other source.

OVALIA, *ō-vā′lĭ-â* [L. *ovalis*, oval, in neut. pl.]: in Latreille's system of zoology, name of those *Læmodipoda* which have the body oval with the segments transverse; the *Cyamidæ* (whale-lice) belong to the division *Ovalia*.

OVAM′POS AND OVAMPOLAND: tribe and their country in the region n. of Great Namaqualand, in s. Africa, extending n. to the Cuanene river, and s. to the parallel of 23° s. lat. The Ovampos or Otjiherero are seemingly a connecting link between the Kafir and negro races. The Ovampo tribes are described by Andersson as of very dark complexion, tall and robust, but remarkably ugly. He found them, however, honest, industrious, and hospitable. They are not entirely pastoral, but cultivate much corn. Living in the same country are the Cattle Damaras, with still more of the negro type, a stout, athletic people, very dirty in their habits, and generally armed with the bow and arrow. They live in constant warfare with the Ghondannup, or Hill Damaras, a nearly pure negro race, on the one hand, and with the Namaqua Hottentots, s. of them, on the other.

Ovampoland is a more fertile region than Namaqualand, from which it is separated by a wide belt of densely-bushed country. It has few rivers, and these not of perennial flow. About fifty m. from the coast, the country rises to a table-land about 6,000 ft. above sea-level, and then declines s. and e. into the deserts of the Kalihari, and the region of Lake N'gami.

Many strong indications of copper ore are found. The principal rivers, or rather water-courses, are the Swakop, Kusip, and their branches, which enter the Atlantic a few miles n. of Walfish Bay. The other rivers in the interior seem to lose themselves in the sands. The climate is healthful, except near the coast, where fever in some seasons prevails. It seldom rains in the coast region, which is very desolate and almost devoid of water. Thunder-storms are very violent in summer. All the large mammalia are more or less plentiful, according as water may be found at the different drinking-places. Elephants, rhinoceroses, elands, and other large animals driven from the s. by the march of civilization, take refuge in the desert region e. of Ovampoland, where sportsmen like Green and Andersson have killed as many as 12 elephants in a day. The country was described first by Sir J. Alexander, who visited its s. border. Galton afterward penetrated much further north; and C. J. Andersson subsequently fully explored it nearly as far n. as the Cuanene. Large numbers of horned cattle are annually collected by traders from the Cape in these regions, and whales abound off the coast. The trade in ostrich-feathers and ivory is of increasing importance, and several trading-stations are established for collection of native products. Some elementary books have been printed in the Otjiherero dialect.

O'VAR: prosperous town of Portugal, province of Beira, 17 m. n. of Aveiro, 20 m. s. of Oporto, on a branch of the Bay of Aveiro. It has an extensive fishery and considerable trade. Pop. 10,500.

O'VARIES: organs peculiar to the female, analogous to the testes in the male. They are two oblong flattened bodies (about an inch and a half in length, three-quarters of an inch in width, and nearly half an inch thick in the human subject), on either side of the uterus, to which they are connected by the Fallopian tube.

The ovary is composed of two well-defined portions—a superficial or 'cortical' portion, and a deep or 'medullary' portion. The whole is inclosed in a tough fibrous coating, which is, however, closely blended with the cortical portion, and cannot be stripped off. It is termed the *tunica albuginea*. The medullary portion is highly vascular and of reddish color. The cortical portion in the adult ovary contains an enormous number of vesicles, varying greatly in size. These are the *Graafian follicles*, and contain the ova or germs—the female element of reproduction. Their number is estimated at 30,000. From 10 to 20 large and more or less mature vesicles are found near the surface, to which they gradually approach as they become developed. The structure of these ovisacs and their contained ova is somewhat complex, and cannot be described here. More or less coincident with menstruation is the process of *ovulation*, i.e., rupture of the wall of a Graafian follicle, and escape of the contained ovum. On its escape from the ovary, the ovum enters the end of

the Fallopian tube, by which it is conveyed into the uterus.

Immediately after the escape of the ovum, the empty follicle becomes filled with blood. The wall of the follicle increases in thickness, owing to the multiplication of its component cell elements. The pigment of the blood undergoes a change, and becomes bright yellow in color. This body is termed the *corpus luteum*. Should the discharged ovum escape from the uterus without becoming impregnated, the corpus luteum reaches its full size in three weeks, and gradually becomes absorbed, and at the end of nine weeks is represented by merely a minute pucker. Should pregnancy occur, the corpus luteum increases in size two months, remains stationary four months, then decreases during the remainder of pregnancy, but is permanently represented by a well-marked cicatrix. This latter is termed the *true* corpus luteum, to distinguish it from that of menstruation.

The ovary is liable to several diseased conditions: (1) It is the seat of acute and chronic inflammation: this may arise from injuries during labor, operations in the pelvis, but very frequently is the result of gonorrheal infection, spreading from the vagina. Such inflammations cause great organic changes in the structure, often leading to sterility; and they are usually associated with severe pain, frequently so intense as to unfit the subject for all active duty. (2) The ovary is the seat of new growths, which may be of several varieties. Some represent enlargements of one or more Graafian follicles, and attain enormous size, sometimes weighing 100 lbs. or more. They contain fluid usually of viscid, ropy nature and brownish color; but sometimes presenting other characters: these enlargements are known as *ovarian cysts* or *ovarian tumors:* the only disease with which they can be confounded is *ascites*, or common abdominal dropsy. Other tumors are more or less solid, and contain portions of hair, teeth, bone, etc., and are known as *dermoid cysts* or *tumors*. Moreover, either sort of tumor may become cancerous.

The treatment of ovarian disease by removal of the offending organ is one of the triumphs of modern surgery. Formerly, relief in cystomata was obtained only temporarily by tapping, that is, withdrawing some of the fluid by means of a trocar and cannula. But the tumor almost always filled again, and though tapping might be repeated time after time—in one case on record 66 times at intervals of about a month; in another, 128 times at intervals of about six weeks—the patient ultimately succumbed to the exhausting drain on the system. Meanwhile, existence was rendered a misery. Now the abdominal wall is laid open, the tumor emptied as much as possible of its contents, the collapsed sac drawn through the incision, its neck secured by ligature or otherwise, the mass cut away, the stump returned to the abdomen, and the wound carefully closed by stitches. The operation for ex[illegible]pation of ovarian cystoma was

performed first by Dr. Ephraim McDowell, of Ky., 1809. This operation was long considered exceedingly dangerous, but has been performed with great and increasing success, especially since the adoption of antiseptic treatment.

The removal of the ovaries and Fallopian tubes, for other than cystic disease, is sometimes performed. The conditions considered as demanding this are: (1) Chronic inflammation in the ovaries or tubes, resulting in formation of pus, etc., in the tubes, or giving rise to intolerable pain and discomfort, rendering life utterly miserable; (2) Cases of fibroid tumor of the uterus, in which life is threatened by the great loss of blood which these tumors often cause. Removal of the ovaries in these cases is usually followed by cessation of growth and shrinking of the tumor, and entire stoppage of serious hemorrhage.

OVARY, n. *ō'vă-rĭ* [F. *ovaire;* Sp. *ovario*, an ovary—from mid. L. *ovārĭă*, the part of the body of birds where the eggs are formed—from L. *ovum*, an egg]: the part in the body of a female animal in which the eggs or first germs of future animals are lodged (see OVARIES): a hollow case in plants which incloses the young seeds (see GERMEN). OVARIAN, a. *ō-vā'rĭ-ăn*, of or relating to the ovary. OVA'RIOUS, a. *-ŭs*, consisting of eggs. OVA'RIUM, n. *-ŭm*, plu. OVA'RIA, *-ă*, an ovary. OVARIOTOMY, n. *ō-vā'rĭ-ŏt'ō-mĭ* [Gr. *tŏmĕ*, a cutting, a lopping]: in *anat.*, the operation of removing the ovaries. OVARITIS, n. *ō-vă-rī'tĭs*, inflammation of the ovaries. OVARALGIA, n. *ō'vă-răl'jĭ-ă* [Gr. *algos*, pain]: pain in the Ovaries (q.v.).

OVATE, a. *ō'vāt* [L. *ovātus*, shaped like an egg—from *ovum*, an egg]: in *bot.*, in the form of an egg; having the shape of a longitudinal section of an egg. O'VATE-LANCEOLATE, a. *-lăn'sē-ō-lāt* [L. *lanceă*, a lance]: in *bot.*, a shape between that of an egg and spear-head. O'VATE-SUBULATE, a. *-sŭb'ū-lāt* [L. *sub'ula*, a shoemaker's awl]: in *bot.*, partly awl and partly egg-shaped. OVATO-OBLONG, a. *ō-vā'tō-ŏb-lŏng*, shaped like an egg, but more drawn out in length.

OVATION, n. *ō-vā'shŭn* [F. *ovation*—from L. *ovātĭōnem*, a lesser triumph of a general for an inferior victory, in which the rites and ceremonies were less imposing than in the triumph—from *ŏvō*, I exult, I rejoice. It. *ovazione*]: any extraordinary and spontaneous mark of respect paid by a city or people to an illustrious person: see TRIUMPH.

OVEN, n. *ŭv'n* [Ger. *ofen;* Goth. *auhns;* Icel. *ofn;* Gr. *ipnos*, an oven: comp. Skr. *agni;* L. *ignis*, fire]: an arched cell capable of being highly heated, used principally for baking bread: any movable utensil used for baking meats before the fire. The usual time-honored bakers' oven is a low-vaulted chamber of stone or brick: the furnace is near the small door at one end, the flue for the exit of the smoke at the other end. The oven is

fired with wood fuel, and, when it is sufficiently heated, the fire is withdrawn, and the dough quickly put in on long wooden shovels. Of late, numerous plans have been devised which heat the oven by a fire outside the baking area, flues of various arrangement carrying the heated gases of combustion below and around the place where the dough is being baked; thus allowing baking to go on continuously, and avoiding the discoloring of the bread with ashes. In some ovens, the sole is capable of rotating, and of being so raised and lowered as to bring first one side, then the other, nearest the heat. In some, used especially for crackers, the dough is laid on metal or stoneware plates, fixed on an endless chain, and kept moving. Perkins's oven is heated by numerous pipes, through which a current of superheated water and steam circulates. Gas burners sometimes supply the heat. A disadvantage in most of the ingenious new types of oven is costliness; and in several the interior of the oven is kept too dry, and so hurts the flavor of the bread. See BREAD: UNFERMENTED BREAD: BREAD, ARMY: BAKERIES, ARMY: COOKERY (ARMY). For coke ovens, see COKE: see also STOVE.

OVEN-BIRD (*Furnarius*): genus of birds of family *Certhiadæ* (q.v.), natives of s. parts of S. America, interesting for the remarkable nests which they construct. They are small birds, with short wings and feeble power of flight. One species, *F. albogularis* or *F. rufus*, is found near Buenos Ayres; another, *F. fuliginosus*, inhabits the Malouine Islands. It is a fearless little bird, regarding the presence of man so little that it may be easily struck down with a switch. Both sexes take part in the construction of the nest, which is generally in an exposed situation, remarkably large, and of the

Oven-bird (*Furnarius fuliginosus*).

shape of a dome, with a small entrance on one side, so as to have much resemblance to a rude oven. It is made of clay, grass, etc., well plastered together. Internally, it is divided into two chambers by a partition reaching nearly to the roof, the eggs being placed in the inner chamber, on a bed of soft grass and feathers. The outer chamber seems intended for the male.

OVENCHYMA, n. *ō-vĕng′kĭ-mă* [L. *ovum*, an egg; Gr. *eng′chuma*, an infusion, the substance of organs—from *ĕngchĕō*, I pour in]: in *bot.*, the tissue of plants composed of oval cells.

OVER, prep. *ō′vėr* [AS. *ofer* or *ober*, over, above; *ufan*, above, upward; *ufera*, higher: Goth. *ufar;* Dan. *over*, above: Ger. *ober*, upper, over; *über*, above: Gr. *huper;* L. *super*, over]: above; upon; opposed to *below;* above in authority; across, as, he leaped *over* the brook; through or diffusely, as, all the world *over;* covering or immersing; often contracted into *o'er:* AD. more than the quantity; beyond a limit; from one to another; from a country beyond the sea; on the surface; past, as, the winter is *over:* completely; in a great degree, as, *over*-difficult: ADJ. upper; beyond. OVER AGAIN, once more. OVER AGAINST, opposite. OVER AND ABOVE, besides; extra. OVER AND OVER, repeatedly. OVER THE LEFT, in *slang*, completely opposite. TO GIVE OVER, to cease from; to consider hopeless. TO RUN OVER, to flow or ride over; to read hastily. TO THROW OVER, to betray; to desert; to fail to give expected help. ALL OVER, in every place; undone or finished, generally in an evil sense.

OVER, *ō′vėr* [AS. *ofer* or *ober*, above (see OVER, prep.)]: prefix, meaning 'above; beyond; too much; to excess.' *Note.*—OVER, as a prefix, is not usually separated by a hyphen: the words with the prefix OVER, keeping in mind the sense of the prefix, are mostly self-explanatory; accordingly, it has not been thought necessary to enter every possible compound having the prefix OVER, though it is hoped that no one in common use has been omitted.

OVERACT, v. *ō′vėr-ăkt′:* to perform to excess; to act more than necessary.

OVERALLS, n. plu. *ō′vėr-awlz* [*over*, and *all*]: loose trousers of a light, stout material, such as canvas, worn over others, by workmen, to keep them clean and from being destroyed; waterproof leggings.

OVERANXIOUS, a. *ō′vėr-ăngk′shŭs:* anxious to excess. O′VERAN′XIOUSLY, ad. *-lĭ.* O′VER-ANXI′ETY, n. *-ăng-zī′ĕ-tĭ*, the state of being overanxious.

OVERARCH, v. *ō′vėr-ârch′:* to cover as with an arch.

OVERAWE, v. *ō′vėr-aw′:* to restrain by fear or by superior influence. O′VERAW′ING, imp. O′VERAWED′, pp. *-awd′.*

OVERBALANCE, v. *ō′vėr-băl′ăns:* to weigh down; to exceed in weight, value, or importance: N. excess of weight or value. O′VERBAL′ANCING, imp. O′VERBAL′-ANCED, pp. *-ănst.*

OVERBEAR, v. *ō′vėr-bâr′:* to overpower; to subdue: to domineer over. O′VERBEAR′ING, imp.: ADJ. haughty; insolent; domineering. O′VERBEAR′INGLY, ad. *-lĭ.*

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